U.S. Scanner News

A Magazine for the Scanner Hobbyist

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Number 1

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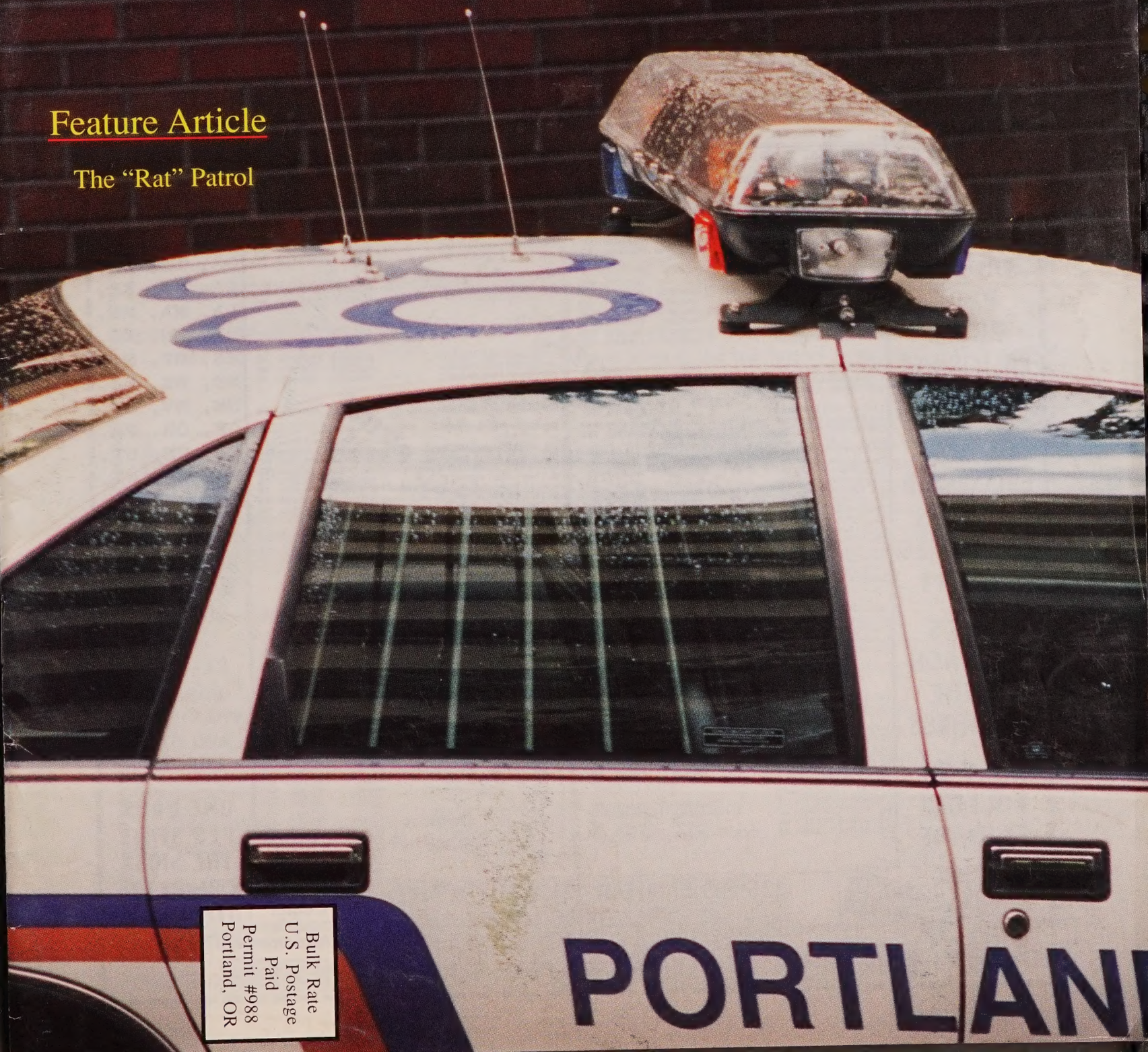

Feature Article

The "Rat" Patrol

Bulk Rate
U.S. Postage
Paid
Permit #988
Portland, OR

"NEATLY ORGANIZED AND HIGHLY USEFUL"

Bob Grove, Publisher, Monitoring Times, Aug. 1994; Ref. North Carolina Edition

THE FREQUENCY ALMANAC©

15 YEARS EXPERIENCE PUBLISHING DIRECTORIES

Simplified Frequency format listed by county.
Each county lists public safety by state, county and city agencies, including 800MHz, followed by business and *all other services.*

COVERS ALL SERVICES BETWEEN 30MHz AND 2GHz

SAMPLE PAGE FROM CALIFORNIA BOOK

ACTUAL CALIFORNIA BOOK IS 820 PAGES 8½ X 11

BOOKS FOR EACH OF THE 50 STATES

EASY TO FOLLOW FORMAT

STATE GOVERNMENT — MISCELLANEOUS

DEL NORTE COUNTY

STATE GOVERNMENT

POLICE

CALIFORNIA, STATE OF	WZR248	42.3400	FB
CALIFORNIA, STATE OF	WZR248	42.5400	FB
CALIFORNIA, STATE OF	WZR248	72.2200	FX2
CALIFORNIA, STATE OF	KME385	75.7600	FX1
CALIFORNIA, STATE OF	KME385	75.9600	FX1
CALIFORNIA, STATE OF	KSQ945	154.9200	FB
CALIFORNIA, STATE OF	WNBV336	155.4750	FB

800MHz PUBLIC SAFETY

CALIFORNIA, STATE OF	KNBG973	857.7375	FB2
CALIFORNIA, STATE OF	KNEM203	857.9375	FB
CALIFORNIA, STATE OF	WNNS451	858.2625	FB2
CALIFORNIA, STATE OF	WNNS451	859.2625	FB2
CALIFORNIA, STATE OF	WNNS451	860.2625	FB2
CALIFORNIA, STATE OF	KNBG973	860.7375	FB2
CALIFORNIA, STATE OF	WPBQ561	867.5375	FB2

FIRE

CALIFORNIA, STATE OF	KPC41	33.6600	FX1
CALIFORNIA, STATE OF	KPC41	33.9800	FX1
CALIFORNIA, STATE OF	KQR617	154.1600	FB2

LOCAL GOVERNMENT

CALIFORNIA, STATE OF	WNKK748	37.2600	FB2
CALIFORNIA, STATE OF	KJS712	153.7550	FB2

FORESTRY CONSERVATION

CALIFORNIA, STATE OF	WNE478	44.6400	FB2
CALIFORNIA, STATE OF	KWE503	44.8000	FB
CALIFORNIA, STATE OF	KWE503	44.8800	FB
CALIFORNIA, STATE OF	KWE503	44.9600	FX1
CALIFORNIA, STATE OF	KBM647	151.2500	FB2
CALIFORNIA, STATE OF	KBM647	151.3550	FB2
CALIFORNIA, STATE OF	KBM647	151.3850	FB2
CALIFORNIA, STATE OF	WNJZ479	151.4150	FB2
CALIFORNIA, STATE OF	KVY51	159.2700	FX1
CALIFORNIA, STATE OF	KVY51	159.3000	FX1
CALIFORNIA, STATE OF	KVX90	159.3300	FX1
CALIFORNIA, STATE OF	KVY51	159.4050	FX1
CALIFORNIA, STATE OF	WGC761	169.5000	FXO
CALIFORNIA, STATE OF	KOO93	171.9250	FXO

HIGHWAY MAINTENANCE

CALIFORNIA STATE OF	KAE7576	453.8500	FXO
CALIFORNIA, STATE OF	WGU627	47.2000	FB
CALIFORNIA, STATE OF	KXQ825	452.9750	FX1
CALIFORNIA, STATE OF	WPBN772	453.8500	FXO

COUNTY GOVERNMENT

POLICE

DEL NORTE, COUNTY OF	WCL735	154.8150	FX1

FIRE

DEL NORTE, COUNTY OF	WNMG296	154.0100	FX1
DEL NORTE, COUNTY OF	WNGY257	154.2500	FB
DEL NORTE, COUNTY OF	WNMG296	154.4150	FB2
DEL NORTE, COUNTY OF	WNGY257	154.4450	FB

LOCAL GOVERNMENT

DEL NORTE, COUNTY OF	WNGN647	39.8200	FB
DEL NORTE, COUNTY OF	KSS224	153.9800	FB2
DEL NORTE, COUNTY OF	WXM691	154.0850	FB
DEL NORTE, COUNTY OF	WGP60	155.0850	MO1

SPECIAL EMERGENCY

DEL NORTE, COUNTY OF	WCL656	462.5250	FX2
DEL NORTE, COUNTY OF	KIB954	463.0000	FB
DEL NORTE, COUNTY OF	KIB954	463.0250	FB
DEL NORTE, COUNTY OF	KIB954	463.0500	FB
DEL NORTE, COUNTY OF	KIB954	463.0750	FB
DEL NORTE, COUNTY OF	KIB954	463.1000	FB
DEL NORTE, COUNTY OF	KIB954	463.1250	FB
DEL NORTE, COUNTY OF	KIB954	463.1500	FB
DEL NORTE, COUNTY OF	KIB954	463.1750	FB

HIGHWAY MAINTENANCE

DEL NORTE, COUNTY OF	WZJ219	156.2400	FB2
DEL NORTE, COUNTY OF	KA48363	159.0150	MO

CRESCENT CITY

FIRE

CRESCENT FIRE PROTEC	WNKJ623	154.2500	FB
CRESCENT FIRE PROTEC	WNKJ623	154.2800	MO
CRESCENT FIRE PROTEC	WNKJ623	154.4450	FB

LOCAL GOVERNMENT

CRESCENT CITY, CITY OF	KIV790	156.0000	FB

SPECIAL EMERGENCY

AIR MED EVAC	WNCX894	155.2200	FB
DEL NORTE AMBULANCE INC	KD20629	150.7750	MO3
DEL NORTE AMBULANCE INC	WPCH896	155.1750	FB
DEL NORTE UNIFIED SCHOOL DIS	WNYW708	155.2800	FB
SUTTER COAST HOSPITA	WNQD425	155.2350	FB
SUTTER COAST HOSPITA	KNDV810	463.0000	FB
SUTTER COAST HOSPITA	KNDV810	463.0250	FB
SUTTER COAST HOSPITA	KNDV810	463.0500	FB
SUTTER COAST HOSPITA	KNDV810	463.0750	FB
SUTTER COAST HOSPITA	KNDV810	463.1000	FB
SUTTER COAST HOSPITA	KNDV810	463.1250	FB
SUTTER COAST HOSPITA	KNDV810	463.1500	FB
SUTTER COAST HOSPITA	KNDV810	463.1750	FB

KLAMATH RIVER

FIRE

KLAMATH FIRE PROTECTION DIST	KNAI398	153.7700	FB

SMITH RIVER

FIRE

SMITH RIVER FIRE PROTECTION	KJS725	154.2500	FB

MISCELLANEOUS

AF	AERONAUTICAL RADIO INC	WCE8	130.2500	FA
AF	AERONAUTICAL RADIO INC	WGH3	129.1500	FA
MC	ALIOTO FISH CO INC	WHU796	156.9000	FC
IB	AMERICAN DETENTION SERVICES	WNMQ243	151.7150	FB
IB	ARCATA REDWOOD CO	WRI901	154.5400	FB
IF	ARCATA REDWOOD COMPANY	KMB577	48.6400	FX1
IF	ARCATA REDWOOD COMPANY	KMB577	49.1200	MO
IF	ARCATA REDWOOD COMPANY	KMB577	49.2000	FB2
IF	ARCATA REDWOOD COMPANY	KMB577	451.7125	MO
IF	ARCATA REDWOOD COMPANY	KMB577	456.7125	MO
IF	BAKER CHOPPING	KAE7576	153.3950	MO
IF	BAKER, GALE	KD22580	153.3950	MO
BA	BER-TEC BROADCASTING INC	WLP746	947.8750	FX
BA	BER-TEC BROADCASTING INC	WLP746	948.1250	FX
IF	BETTENDORF TRUCKING	WNQC676	153.2750	FB4
IF	BETTENDORF TRUCKING	WNQC676	158.4150	FX1
IF	BETTENDORF TRUCKING	WNQC676	159.5100	FX1
IB	BLISS, ROBERT M:BLISS, DOROT	WNNR994	151.8650	FB
IW	BLUE STAR GAS CO	KIX951	158.1600	FB
IF	BROWN, RICHARD	WNRL805	153.2000	FB
IB	C & C EXCAVATING	WNMU400	461.6750	FB

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Dealer Inquiries Welcome

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Cover Photo - One of the Portland Police "RAT" units, showing the three antennas used in the system. **Photo By R. Gehri.**

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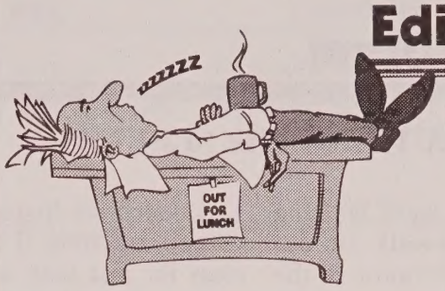


Editorial

by RL Gary

Were'rrr Baaaack.....

Open Letter to the readership.

After what seems like an eternity we're back up and running. I would like to extend my thanks to all of our readers who have patiently awaited the restart of U.S. Scanner News, and to those of you who have written, I am truly sorry about the problems we have had.

Bob's Publications is no more. It has been turned over to U.S. Scanner Publications, which is owned by Ken Gilbert of Portland, Oregon. He is now the Publisher and Owner of U.S. Scanner News. I have been retained as a consultant to help with the switchover and will continue as editor. Ken has agreed to honor all outstanding subscriptions and, additionally, add a few months to each outstanding subscription.

On page 14 you will find a sidebar that explains how to read the top line of your label. Please look it over and if there are any mistakes let us know so we can correct it.

Over the next few months USSN will be changing and upgrading to make it the best scanner magazine on the market. We have some of the best writers in the hobby on staff and will be adding more over the next few months. In upcoming issues, we will bring you features on cellular systems, trunking, railroad systems and phase inversion scrambling. This is in addition to our past regular features, such as valuable information on frequency allocations. As always, USSN will continue to bring you the latest in scanning news, the most complete (and unbiased) reviews and the truth about what is really going on in the scanner industry.

We are glad to be back and anxious to serve you. Once again, thank you for patiently waiting.

Bob Gary
Managing Editor
U.S. Scanner News

Frequency Forum

See if you can find some of the private detectives that lurk around your town, even neighborhood.

SLEUTHING THE SLEUTHS

by R.L. Smith

My wife and I were walking down the sidewalk in our peaceful neighborhood (ours is the only one left) early one evening. It was a nice summer evening and the temperature was just about at the point of being comfortable.

As we walked along I noticed a mini-van parked across the street with two husky-looking men sitting in it. I also noticed there were several cigarette butts on the ground by the van, indicating that they had been parked there for some time.

This does look somewhat suspicious, and they don't appear to be police officers. As far as I am concerned, they don't belong. So I rush home and give 911 a call to report what I have seen.

I head over to my scanner to listen for the call. Darn that new 800 MHz trunking system! It is going to be almost impossible to pick out the call. Then it hits me. Since the call is in my area I can listen to the input frequencies of the trunk. I won't be able to hear the dispatcher but I will hear the car as he arrives at the scene.

Sure enough, in a few minutes I hear a car go out at the location of the suspicious car. He runs their names and vehicle and adds that they claim to be private detectives. The officer requests that the dispatcher call their company to verify their story. He also tells the dispatcher that they are in contact with their office by two-way radio. "WHAT?"

I have the company name the officer gave the dispatcher on the radio, so right quick I bring up the FCC database that I just received for my computer. I type in the name of the company and up pops the license information. They are licensed on a frequency of 464.250 MHz. Good, no 800 MHz trunking.

I punch the frequency into channel 400 on my 2006 (I keep channel 400 clear for just such an occasion). Sure enough, there they are, talking to their office, and are they upset! It seems that they were watching a house to see if the wife had a boyfriend coming by while the husband was at work.

I decide to keep this frequency in my scanner for future reference. I noticed that there were several other companies sharing the same frequency, so I know I will be hearing other traffic unrelated to the private detectives but it may be worth it. However, most of the other companies will be closed at night and maybe the detectives will be working on surveillances then.

This is just an example of what can be heard. Don't expect to hear Sam Spade-type transmissions, though. Most of the work done by private detectives is of a boring nature. Checking employment information, locating missing persons and the like.

However, if you listen regularly you may hear them trying to catch a bail jumper or some other interesting activities.

On the following pages we have included some listings for investigative companies nationwide. The listing gives companies that are involved in detecting, investigating, bail skippers and bodyguard service.

There are lot of companies that are involved in the detective business that provide security service also. Unfortunately, on the security side you will probably hear mostly routine communications by security guards at various locations.

We hope you will enjoy this information and we may make it a monthly column, featuring a different type of communications each month.

$ Wanted $

U.S. Scanner News is looking for editors for the following monthly columns: U.S. Government, Military and any aspect of Public Safety. We also need feature article writers.

If you think you can handle one of the monthly columns or would like to write an indiviual article, drop us a note or call 1-503-230-6999 and ask for a copy of our writers guide.

CITY	LICENSEE	FREQ.
Alabama		
COLUMBUS	INTERNATIONAL DETECTIVE INC	463.6250
MOBILE	WHITE GUARD & DETECTIVE SERVICE	151.6250
Alaska		
NORTH POLE	ULTIMATE SECURITY AND DETECTIVE	461.1250
Arizona		
TUCSON	PINKERTON INVESTIGATIONS	462.1500
Arkansas		
HOT SPRINGS	SANDERS DETECTIVE & SECURITY AGE	151.9250
California		
AROMAS	JAMES H INGRAM INVESTIGATIONS	154.5700
BONITA	M & W INVESTIGATIONS INC	151.8650
NORTH HOLLYWOOD	WEST COAST DETECTIVES INC	464.4500
SACRAMENTO	GOLDEN STATE INVESTIGATIONS INC	461.5000
SAN DIMAS	MIRAGE INVESTIGATIONS	151.6550
SAN FRANCISCO	PRICE & SONS INVESTIGATIONS	463.3500
SANTA ANA	EDGAR INVESTIGATIONS	853.4875
SANTA ANA	METRO COAST INVESTIGATIONS INC	461.5000
SANTA BARBARA	ROMER DETECTIVE & SECURITY AGENC	463.4000
SANTA MARIA	MILLER SECURITY INVESTIGATIONS I	461.1500
VALLEJO	DATAQUEST INVESTIGATIONS	461.7500
VALLEJO	DATAQUEST INVESTIGATIONS	464.3000
WEST COVINA	PROFESSIONAL SURVEILLANCE GROUP	463.7500
Colorado		
BOULDER	CENTRAL INVESTIGATIONS & SECURIT	464.3500
COLORADO SPRING	DOUGLAS DETECTIVE & SECURITY SER	463.7250
DENVER	SCHMIDT INVESTIGATIONS	464.6250
LONGMONT	D&D INVESTIGATIONS	461.0750
LONGMONT	D&D INVESTIGATIONS	461.2250
LONGMONT	D&D INVESTIGATIONS	464.5000
Connecticut		
SUFFIELD	SENTRY SECURITY & DETECTIVE AGEN	462.6250
Delaware		
HOCKESSIN	BULLENS DETECTIVE AGENCY	151.7150
NEWARK	ACTION DETECTIVE & GUARD AGENCY	502.0625
WILMINGTON	LACKAWANA DETECTIVE AGENCY INC	462.0500
District of Columbia		
BLADENSBURG	SUBURBAN INVESTIGATORS INC	461.9250
WASHINGTON	ASSOCIATED INVESTIGATOR	462.0250
WASHINGTON	FAIR DETECTIVE AND SECURITY AGEN	464.3500
WASHINGTON	METROPOLITAN DETECTIVE BUREAU IN	463.5000
Florida		
BEVERLY HILLS	BEVERLY HILLS SURVEILLANCE UNIT	151.9550
HOLLYWOOD	HIGHLANDER DETECTIVE AGENCY	461.4500
JACKSONVILLE	SEARCH INTERNATIONAL DETECTIVE S	461.5500
LARGO	BRIAN & HORTON INVESTIGATIONS IN	461.6500
MIAMI	DADE INVESTIGATIONS	464.0750
MIAMI	WEST FLA DETECTIVE BUREAU	935.2250
ORLANDO	DATA SEARCH INVESTIGATIONS COMPA	461.8000
ORLANDO	FLORIDA STATE INVESTIGATIONS INC	854.6125
PALM HARBOR	COASTAL STATES INVESTIGATIONS IN	852.9625
PINELLAS PARK	BAY AREA INVESTIGATORS INC	461.5750
WEST PALM BEACH	ARM SECURITY AND INVESTIGATIONS	463.9750
Georgia		
ATLANTA	ATLANTA INVESTIGATIONS	463.3500
DALTON	JJK SECURITY & INVESTIGATIONS	151.6250
FORT OGLETHORPE	A & A INVESTIGATIONS	151.9250
Hawaii		
HILO	HILO SECURITY INVESTIGATIONS COR	464.0250
Illinois		
CHICAGO	COSMOPOLITAN DETECTIVE AND SECUR	472.4125
CHICAGO	COSMOPOLITAN DETECTIVE AND SECUR	475.4125
CHICAGO	COUNSELERS INVESTIGATIONS	464.3750
CHICAGO	COUNSELERS INVESTIGATIONS	464.5250
CHICAGO	DIGBYS DETECTIVE & SECURITY AGEN	464.0500
CHICAGO	GEORGE T SIMS SECURITY DETECTIVE	463.8750
CHICAGO	PROFESSIONALS DETECTIVE AGENCY I	461.8375
CHICAGO	PROFESSIONALS DETECTIVE AGENCY I	462.7875
CHICAGO	STAR DETECTIVE & SECURITY AGENCY	472.1875
CHICAGO	STAR DETECTIVE & SECURITY AGENCY	475.1875
CHICAGO	TARGET DETECTIVE AGENCY INC	461.9750
CHICAGO	THREE STAR DETECTIVE AGENCY	461.8000
CHICAGO	VICTOR H MAY INVESTIGATIONS	462.1500
GREENVILLE	SHEELEY INVESTIGATIONS	154.5400
MOUNT PROSPECT	ILLINOIS COUNTIES DETECTIVE & PA	151.8050
MOUNT PROSPECT	ILLINOIS COUNTIES DETECTIVE & PA	154.5150
MOUNT PROSPECT	ILLINOIS COUNTIES DETECTIVE & PA	154.5400
MOUNT PROSPECT	ILLINOIS COUNTIES DETECTIVE & PA	154.6000
SPRING GROVE	L & H INVESTIGATIONS	151.6250
SPRING GROVE	L & H INVESTIGATIONS	154.5700
SPRING GROVE	L & H INVESTIGATIONS	154.6000
SPRING GROVE	L & H INVESTIGATIONS	461.1000
SPRING GROVE	L & H INVESTIGATIONS	463.8250
SPRINGFIELD	ABLE DETECTIVE AGENCY INC	460.9000
SPRINGFIELD	ABLE DETECTIVE AGENCY INC	462.6250
SWANSEA	BOONE INVESTIGATIONS	151.6250
URBANA	SPARTAN DETECTIVE AGENCY	464.2250
Indiana		
BROWNSBURG	PROFESSIONAL INVESTIGATIONS INC	43.0000
CICERO	INVESTIGATIONS INTERNATIONAL INC	154.5150
CICERO	INVESTIGATIONS INTERNATIONAL INC	154.5400
ELKHART	GUARDIAN DETECTIVE AGENCY INC	464.0500
EVANSVILLE	ALVEY DETECTIVE AGENCY	154.5150
EVANSVILLE	IRA E CLARK DETECTIVE AGENCY INC	151.6850
EVANSVILLE	MUDD ROCK INVESTIGATIONS INC	151.6850
GARY	JARRETT DETECTIVE AGENCY INC	154.6000
GARY	JARRETT DETECTIVE AGENCY INC	461.2500
HAMMOND	INTRETECH INVESTIGATIONS & SECUR	464.4750
HAMMOND	STAR SECURITY AND INVESTIGATIONS	463.3500
INDIANAPOLIS	DODSON DETECTIVE AGENCY	464.0750
INDIANAPOLIS	HOUSTON INVESTIGATIONS INC	461.8250
INDIANAPOLIS	NORTHWEST DETECTIVE AGENCY	461.5000
LOUISVILLE	MILLS DETECTIVE AGENCY INC	463.3250
PAOLI	OWEN DETECTIVE AGENCY INC	154.5400
SOUTH BEND	MEYERS DETECTIVE BUREAU INC	151.6250
Iowa		
CEDAR RAPIDS	BAILEYS DETECTIVE AGENCY INC	464.1250
CEDAR RAPIDS	TWO STAR DETECTIVE AGENCY INC	151.9550
MILAN	PRIVATE INVESTIGATIONS INC	463.9750
Kenyucky		
HENDERSON	WEST STAR INVESTIGATIONS	464.7000
LOUISVILLE	INTERCOASTAL INVESTIGATIONS	463.8500
LOUISVILLE	MILLS DETECTIVE AGENCY INC	464.3750
LOUISVILLE	MILLS DETECTIVE AGENCY INC	855.0375
SOMERSET	GOSSETT INVESTIGATIONS	151.7150
Louisiana		
BATON ROUGE	HOWARD WEATHERS INVESTIGATOR SER	463.6250
BELLE CHASSE	SIMON DETECTIVE AGENCY	463.4250
SHREVEPORT	AYMOND NICHOLS INVESTIGATIONS IN	461.6750
SHREVEPORT	PROFESSIONAL INVESTIGATIONS	462.0000

CITY	LICENSEE	FREQ.
Maryland		
BALTIMORE	ARRINGTON DETECTIVE AND SECURITY	853.4875
CUMBERLAND	ALLEGANY DETECTIVE AGENCY	151.9250
FREDERICK	POTOMAC VALLEY DETECTIVE AGENCY	463.4250
OCEAN CITY	JERSCHEID DETECTIVE AGENCY	461.7750
OCEAN CITY	JERSCHEID DETECTIVE AGENCY	463.3750
Massachusetts		
BOSTON	INTERSTATE DETECTIVE BUREAU	463.7250
BOSTON	J C DETECTIVE AND SECURITY AGENC	462.0875
BOSTON	J C DETECTIVE AND SECURITY AGENC	462.1250
EVERETT	ALLIANCE DETECTIVE & SECURITY SE	151.8950
EVERETT	ALLIANCE DETECTIVE & SECURITY SV	151.9250
HOLDEN	LINDFORS INVESTIGATIONS INC	461.2750
HYANNIS	CAPE CODE DETECTIVE & SECURITY A	461.5750
LYNN	OMEGA DETECTIVE AGENCY INC	461.9750
MARLBORO	MASTER DETECTIVE INC	461.5000
MARLBORO	MASTER DETECTIVE INC	464.1000
MARLBORO	MASTER DETECTIVE INC	464.2250
SPRINGIFELD	MILLER DETECTIVE AGENCY INC	151.8950
WAYLAND	BAY COLONY INVESTIGATORS INC	461.3250
WORCESTER	EAGLE DETECTIVE AGENCY INC	27.4500
WORCESTER	JAS R HORGAN DETECTIVE & SECURIT	464.8750
Michigan		
ADRIAN	ADA DETECTIVE & SECU	464.2500
DEARBORN HEIGHT	SALEM INVESTIGATIONS INCORPORATE	154.5150
DEARBORN HEIGHT	SALEM INVESTIGATIONS INCORPORATE	154.5400
EAST DETROIT	CMD INVESTIGATIONS	461.7000
EAST DETROIT	CMD INVESTIGATIONS	464.5625
FRASER	RICCO INVESTIGATIONS & SECURITY	853.4875
GRAND RAPIDS	PRIORITY INVESTIGATIONS INC	461.8000
GRAND RAPIDS	PRIORITY INVESTIGATIONS INC	461.8375
GRAND RAPIDS	PRIORITY INVESTIGATIONS INC	464.6125
GRAND RAPIDS	PRIORITY INVESTIGATIONS INC	466.0375
GRAND RAPIDS	PRIORITY INVESTIGATIONS INC	469.6125
LANSING	DIAMOND DETECTIVE AGENCY	464.7500
LANSING	EARGOOD SECURITY & DETECTIVE AGE	464.6500
LINCOLN PARK	MERCHANTS DETECTIVE AGENCY INC	151.8050
OAK PARK	DEFOE DETECTIVE AND SECURITY AGE	461.7500
OAK PARK	DEFOE DETECTIVE AND SECURITY AGE	463.6000
OAK PARK	DEFOE DETECTIVE AND SECURITY AGE	464.7500
SARANAC	A & R INVESTIGATORS	464.5000
SHELBY	STANDFUSS PRIVATE DETECTIVE	151.7450
Minnesota		
HOPKINS	LEADENS INVESTIGATIONS INC	462.0875
HOPKINS	LEADENS INVESTIGATIONS INC	467.0875
MINNEAPOLIS	BLOODHOUND INVESTIGATIONS	464.3500
MINNEAPOLIS	PREMIER INVESTIGATIONS INC	461.4000
Mississippi		
JACKSON	A 1 DETECTIVE AND PATROL SERVICE	461.1750
JACKSON	DAY DETECTIVES INC	460.9250
JACKSON	DAY DETECTIVES INC	461.3625
JACKSON	PENDLETON DETECTIVES OF MS INC	464.9000
NATCHEZ	BLUFF CITY INVESTIGATIONS & SECU	463.2500
Montana		
KALISPELL	MOONLIGHTING DETECTIVE AGENCY IN	152.3150
Nebraska		
GRAND ISLAND	CROCKER ADJUSTERS & INVESTIGATOR	154.5150
Nevada		
LAS VEGAS	STATE WIDE INVESTIGATIONS INC	463.5250
RENO	BRAND PRIVATE INVESTIGATIONS	464.7750
RENO	BRAND PRIVATE INVESTIGATIONS	464.8000

CITY	LICENSEE	FREQ.
New Hampshire		
AUBURN	U S A INVESTIGATIONS INC	461.3500
AUBURN	U S A INVESTIGATIONS INC	463.6500
New Jersey		
CHERRY HILL	ACCU TRACE INVESTIGATIONS INC	462.1750
ELIZABETH	NILSEN DETECTIVE AGENCY	935.2000
FORT LEE	ARNOLD M JONES DETECTIVE AGENCY	471.7125
LAKE STOCKHOLM	ABBOT DETECTIVE AGENCY INC	462.5750
MEDFORD	VTS INVESTIGATIONS INC	462.0250
MEDFORD	VTS INVESTIGATIONS INC	464.5500
NEWARK	ELECTRONIC SURVEILLANCE & RESPON	462.1375
NEWARK	ELECTRONIC SURVEILLANCE & RESPON	467.1375
NEWARK	ESQUIRE INVESTIGATIONS & SECURIT	464.1375
NEWARK	ESQUIRE INVESTIGATIONS & SECURIT	469.1375
New Mexico		
ALBUQUERQUE	BDA INVESTIGATIONS	461.7000
New York		
BRONX	U S SURVEILLANCE	469.2875
ITHACA	AGENT OF THE YEAR INVESTIGATIONS	151.6250
JAMESTOWN	PRI DET INVESTIGATIONS INC	154.5400
MANORVILLE	LATON INVESTIGATIONS INC	151.8050
NEW YORK	EAR PRIVATE INVESTIGATIONS & SEC	463.5250
NEW YORK	ELITE INVESTIGATIONS LTD	463.3625
NEW YORK	ELITE INVESTIGATIONS LTD	468.3625
NEW YORK	EXPLORER INVESTIGATIONS INC	462.5500
NEW YORK	WORLD WIDE DETECTIVE BUREAU	853.3375
PEARL RIVER	FITZPATRICK INVESTIGATIONS INC	464.9750
ROCHESTER	DOYLE DETECTIVE BUREAU INC	460.9750
ROCHESTER	DOYLE DETECTIVE BUREAU INC	462.1250
ROCKVILLE CENTR	CRAIG INVESTIGATIONS INC	154.5700
RONKONKOMA	AERO INVESTIGATIONS & SEC SVC IN	461.7500
RONKONKOMA	AERO INVESTIGATIONS & SEC SVC IN	461.8750
RONKONKOMA	AERO INVESTIGATIONS & SEC SVC IN	463.5500
SELDEN	FRED SHORT INVESTIGATIONS	461.6625
SELDEN	FRED SHORT INVESTIGATIONS	461.6875
SELDEN	FRED SHORT INVESTIGATIONS	461.8125
SELDEN	FRED SHORT INVESTIGATIONS	461.9125
SELDEN	FRED SHORT INVESTIGATIONS	462.1625
SELDEN	FRED SHORT INVESTIGATIONS	462.8125
STATEN ISLAND	APB INVESTIGATIONS INC	461.8250
STATEN ISLAND	APB INVESTIGATIONS INC	462.0125
SYOSSET	L J INVESTIGATORS & ASSOCIATES	461.6500
SYOSSET	L J INVESTIGATORS & ASSOCIATES	463.8000
UTICA	L B SECURITY & INVESTIGATIONS IN	154.5700
WEST BABYLON	SEARCH INVESTIGATIONS LTD	464.8250
North Carolina		
GREENSBORO	POWERS DETECTIVE & P	464.2500
LEWISVILLE	TRIAD DETECTIVE AGENCY INCORPORA	151.6250
LEWISVILLE	TRIAD DETECTIVE AGENCY INCORPORA	151.9550
LEWISVILLE	TRIAD DETECTIVE AGENCY INCORPORA	461.0750
RALEIGH	WATCHFUL EYE INVESTIGATIONS INC	464.5000
WINSTON SALEM	EVERHART DETECTIVE AND RECOVERY	151.6250
WINSTON SALEM	EVERHART DETECTIVE AND RECOVERY	151.8050
Ohio		
ASHTABULA	NEO INVESTIGATIONS	35.9200
CLEVELAND	D & A INVESTIGATIONS & SECURITY	461.8250
CLEVELAND	FEDERAL DETECTIVE BUREAU	461.6750
CLEVELAND	FIDELITY SECURITY & DETECTIVE IN	461.5250
DAYTON	J R FINIAY DETECTIVE AGENCY INC	461.7500
HILLIARD	AMERICAN INVESTIGATIONS	151.6250
MEDWAY	KEETON SECURITY & INVESTIGATIONS	464.5250
REYNOLDSBURG	SMITHS DETECTIVE & SECURITY	464.7250
SPRINGFIELD	INTERSTATE DETECTIVE	461.5250
STEUBENVILLE	JEFFERSON INVESTIGATORS AND SECU	154.5400
WINTERSVILLE	R C SECURITY & INVESTIGATIONS IN	461.2750
WINTERSVILLE	R C SECURITY & INVESTIGATIONS IN	464.4000
WINTERSVILLE	R C SECURITY & INVESTIGATIONS IN	464.6250

Oregon

CITY	LICENSEE	FREQ.
PORTLAND	CONTINENTAL DETECTIVE & PROTECTI	463.8250
PORTLAND	NORTHWEST INVESTIGATIONS	463.9750

Pennsylvania

CITY	LICENSEE	FREQ.
ALLENTOWN	SPECIAL INVESTIGATIONS	461.4250
BETHLEHEM	AMERICAN DETECTIVE AGENCY	461.9750
DAUPHIN	SLOAN DETECTIVE AGENCY	151.6250
DAUPHIN	SLOAN DETECTIVE AGENCY	151.7150
HANOVER	SPONSELLER DETECTIVE AGENCY	154.5400
HAZELTON	DEFRANCESCO DETECTIVE AGENCY	462.0000
HAZLETON	INTREPID DETECTIVE AGENCY INC	461.3000
HAZLETON	INTREPID DETECTIVE AGENCY INC	461.5500
HERMITAGE	KILGORE DETECTIVE AGENCY AND SEC	151.6550
HERMITAGE	KILGORE DETECTIVE AGENCY AND SEC	151.8650
LAFAYETTE HILL	RAUCH DETECTIVE AGEN	461.8250
NORRISTOWN	FAIREL DETECTIVE AGENCY INC	463.6250
OREFIELD	CONFIDENTIAL INVESTIGATIONS	461.7000
PENNSAUKEN	HAINES DETECTIVE AGENCY INC	461.4000
PHILADELPHIA	SHEPPARD DETECTIVE AGENCY	463.3250
PITTSBURGH	BARRETT DETECTIVE BUREAU	464.3000
PITTSBURGH	CAULEY DETECTIVE AGENCY	462.6000
PITTSBURGH	CAULEY DETECTIVE AGENCY INC	462.0250
PITTSBURGH	FOUR STAR INVESTIGATIONS	463.7500
PITTSBURGH	INTERSTATE INVESTIGATIONS INC	463.2750
PITTSBURGH	METRO INVESTIGATIONS	461.5750
READING	BROWN DETECTIVE AGEN	151.6250
READING	BROWN DETECTIVE AGEN	151.9250
RICHBORO	BUCKS COUNTY INVESTIGATIONS LTD	154.5400
STATE COLLEGE	PENN STATE INVESTIGATIONS INC	151.8050
YORK	SCHAAD DETECTIVE AGENCY INC	461.0250
YORK	SCHAAD DETECTIVE AGENCY INC	461.1250
YORK	SCHAAD DETECTIVE AGENCY INC	461.3500
YORK	SCHAAD DETECTIVE AGENCY INC	461.5250
YORK	SCHAAD DETECTIVE AGENCY INC	461.7500
YORK	SCHAAD DETECTIVE AGENCY INC	463.6750

Puerto Rico

CITY	LICENSEE	FREQ.
ARECIBO	AMERICAN DETECTIVE ACADEMY	151.8050
FAJARDO	FAJARDO PRIVATE DETECTIVE AND SE	461.3000
FAJARDO	FAJARDO PVT DETECTIVE & SECURITY	462.5500
SAN JUAN	COMPUTER INVESTIGATIONS CENTER	461.0250

South Carolina

CITY	LICENSEE	FREQ.
COLUMBIA	COLUMBIA PRIVATE DETECTIVES AGEN	461.3000
COLUMBIA	PALMETTO DETECTIVE & RECOVERY AG	464.2500
FLORENCE	BROWNS DETECTIVE SERVICE	463.5500
SPARTANBURG	SPARTAN DETECTIVE AGENCY INC	151.7150

Tennessee

CITY	LICENSEE	FREQ.
CHATTANOOGA	MOORE DETECTIVE AGENCY INCORPORA	154.5700
DRESDEN	CONFIDENTIAL INVESTIGATORS OF TE	464.4000
LENOIR CITY	K & S INVESTIGATIONS INC	463.9875
MEMPHIS	TENNESSEE DETECTIVE SECURITY SER	464.0250
MURFREESBORO	MID STATE INVESTIGATIONS	464.8750
NASHVILLE	CHOICE INVESTIGATIONS	461.6250
NASHVILLE	CHOICE INVESTIGATIONS	464.2250
SEYMOUR	INVESTIGATORS INC	460.8250

Texas

CITY	LICENSEE	FREQ.
DALLAS	L V BATTARBEE INVESTIGATIONS	851.3125
DALLAS	L V BATTARBEE INVESTIGATIONS	851.5125
DALLAS	L V BATTARBEE INVESTIGATIONS	851.7875
DALLAS	L V BATTARBEE INVESTIGATIONS	852.5125
DALLAS	L V BATTARBEE INVESTIGATIONS	852.5625
DALLAS	L V BATTARBEE INVESTIGATIONS	852.9125
DALLAS	L V BATTARBEE INVESTIGATIONS	853.2125
DALLAS	L V BATTARBEE INVESTIGATIONS	853.3375
DALLAS	L V BATTARBEE INVESTIGATIONS	853.9375
DALLAS	L V BATTARBEE INVESTIGATIONS	854.0125
DALLAS	L V BATTARBEE INVESTIGATIONS	854.4875
DALLAS	SMITH DETECTIVE AGENCY NIGHWATCH	460.9000
EL PASO	THE INVESTIGATORS	464.1250
FORT WORTH	AAA PRIVATE INVESTIGATIONS	461.8500
FORT WORTH	AAA PRIVATE INVESTIGATIONS	463.9750
HOUSTON	ACTA INVESTIGATIONS	464.3500
KILLEEN	I S R INVESTIGATIONS	463.5250
LEWISVILLE	INTERNATIONAL INVESTIGATORS	154.5150
MC ALLEN	A CORDOVA INVESTIGATIONS INC	461.0250
SAN ANTONIO	ACTION INVESTIGATORS	461.3250
SAN ANTONIO	PROFESSIONAL INVESTIGATIONS INC	461.5000
WATAUGA	ALLIANCE INVESTIGATIONS	483.5875
WATAUGA	ALLIANCE INVESTIGATIONS	486.5875

Utah

CITY	LICENSEE	FREQ.
TOOELE	PALITZ DETECTIVE AGENCY	43.0000

Vermont

CITY	LICENSEE	FREQ.
WILLISTON	SECURITY AND SURVEILLANCE ASSOCI	462.8750

Virginia

CITY	LICENSEE	FREQ.
ALEXANDRIA	COMMONWEALTH INVESTIGATIONS INC	151.8650
FREDERICKSBURG	VIRGINIA DETECTIVE AGENCY	464.3000
NEWPORT NEWS	PARADIGM INVESTIGATIONS AND EXEC	853.4875
OAKTON	POTOMAC INVESTIGATIONS INC	463.3500
ROANOKE	DELTA INVESTIGATIONS INC	463.4000

Washington

CITY	LICENSEE	FREQ.
FEDERAL WAY	KETCHEM INVESTIGATIONS	463.3000
PASCO	ALPHA SECURITY & INVESTIGATIONS	462.1750
TACOMA	HOOVER INVESTIGATIONS	151.8950

West Virginia

CITY	LICENSEE	FREQ.
CALVIN	CALVIN DETECTIVE AGENCY INC	151.8350
FALLING WATERS	SAMSELL SECURITY & DETECTIVE AGE	461.1750
PARKERSBURG	AMRIC SECURITY & INVESTIGATIONS	151.9250
PARKERSBURG	AMRIC SECURITY & INVESTIGATIONS	151.9550
SOPHIA	DETECTIVE PROCESS SECURITY AND A	463.7750
SOPHIA	DETECTIVE PROCESS SECURITY AND A	464.2000
WINTERSVILLE	R C SECURITY & INVESTIGATIONS IN	461.2750
WINTERSVILLE	R C SECURITY & INVESTIGATIONS IN	464.4000
WINTERSVILLE	R C SECURITY & INVESTIGATIONS IN	464.6250

Wisconsin

CITY	LICENSEE	FREQ.
ELM GROVE	MID WEST DETECTIVE AGENCY INC	151.6250
RHINELANDER	PRIVATE INVESTIGATORS & SHADOW S	151.7450
WEST ALLIS	CONTINENTAL INVESTIGATIONS & SEC	464.5250
WILLIAMS BAY	STAR DETECTIVE AGENCY INC	463.2000

Nationwide

CITY	LICENSEE	FREQ.
ALEXANDRIA	COMMONWEALTH INVESTIGATIONS INC	151.6250
CHICAGO	PETER FRAIN DETECTIVE AGENCY	464.5000
CHICAGO	PETER FRAIN DETECTIVE AGENCY	464.5500
CINCINNATI	GENERAL CORPORATE INVESTIGATIONS	464.5000
DEARBORN	REED DETECTIVES AGENCY INC	464.5500
DOVER	BENNETT DETECTIVE AND PROTECTIVE	151.6250
EVANSVILLE	IRA E CLARKE DETECTIVE AGENCY IN	151.6250
FORT LAUDERDALE	LOU NAPPI INTL DETECTIVE BUREAU	151.6250
GADSDEN	WILLIAMS INTERNATIONAL DETECTIVE	151.6250
HASBROUCK HEIGH	GALLIONE DETECTIVE AGENCY INC	35.0400
HAZEL CREST	DIAMOND DETECTIVE AGENCY	151.6250
LANHAM	PIONEER INVESTIGATIONS INC	853.4875
LINCOLN PARK	MERCHANTS DETECTIVE AGENCY INC	151.6250
NAPERVILLE	INPHOTO SURVEILLANCE INC	464.5000
OAKLAND	BRUCE M BUTLER INVESTIGATIONS	464.5500
OCEAN CITY	PROTECTION TIME INVESTIGATIONS	853.4875
PARKERSBURG	AMRIC SECURITY & INVESTIGATIONS	151.6250
PARKERSBURG	AMRIC SECURITY & INVESTIGATIONS	151.9250
PARKERSBURG	AMRIC SECURITY & INVESTIGATIONS	151.9550
SHREWSBURY	HOFFMAN SECURITY & DETECTIVE AGE	151.6250

Note

This list is representative, and by no means complete.

ANTENNAS FOR TODAY'S SCANNERS

Why antenna gain and directionality is so important with todays scanners.

ANTENNA GAIN AND DIRECTIONALITY

by W. Clem Small, KR6A, CET

Antennas are devices that catch passing radio signals and convert them to radio-frequency current; this current is then furnished to your scanner receiver so you can hear what that signal has to say. After you've been working with scanners for awhile, you come to realize that the only interface which you have with the rest of the scanner world is your antenna. That of course, makes your antenna a rather important component of your scanner system. A mediocre scanner receiver used with an excellent antenna will often give better performance than an excellent scanner receiver used with a mediocre antenna. So in this issue we will talk about some of the factors which affect the functioning of an antenna.

To begin, let's admit that any old wire that you happen to use as an antenna is going to function to some degree. Many of us, when needing an antenna quickly, have relied on a piece of coat-hanger wire and found that it gave pretty decent reception. Any funky old antenna you patch together will usually give you some kind of reception and it may even give you totally satisfactory results, depending on your requirements!

GAIN AND DIRECTIONALITY

If it's true that an odd bit of wire can give us acceptable reception then why bother with building or buying a more sophisticated scanner antenna? Well, notice that the claim made in the preceding paragraph in reference to the odd bit of wire's performance includes the phrase "depending on your requirements." There are some situations in which you will have special requirements that just "any piece of wire" may not be able to satisfy. Let's consider some examples of such situations. Imagine that you are using a piece of coat hanger wire for an antenna and that you have caught a really exciting exchange on your scanner in which one of the stations you are receiving is just a little too weak to hear well. If you had an antenna with a bit more responsiveness to the signals (gain) than you are likely to get from a "coat hanger antenna" it is likely that you would be able to receive the weaker station and hear all the action. Now consider another example in which there are two stations transmitting on one channel and you want to receive just one of them; the problem is that when both stations transmit simultaneously it is impossible to understand the one you want to receive. If these stations are each in a different direction from your location and you utilize an antenna with sufficient "directionality" you can reduce or eliminate the interfering signal by orienting your antenna properly.

Obviously both gain and directionality are important aspects of an antennas performance. And, interestingly, they are almost always related to one another: higher gain usually means greater directionality and vice versa. Typically we think of a "beam" antenna when we want either a high level of gain or a high degree of directionality. Common beam antenna designs include the Yagi-Uda, cubical-quad, log-periodic, corner-reflector and parabolic-dish reflector antennas.

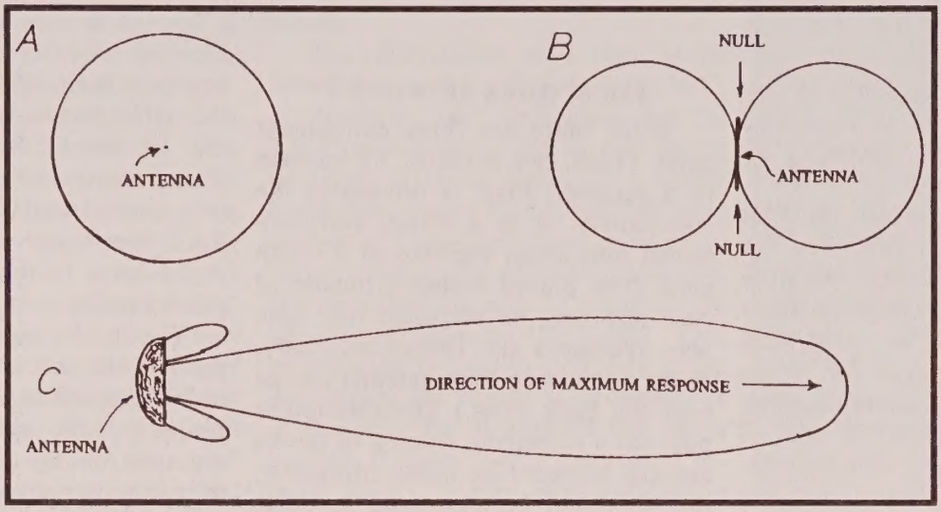
To make gain measurements meaningful in a practical sense, an antenna's gain performance is often compared to the gain of a halfwave dipole. For instance, if a certain antenna receives a signal and gives twice the output that a halfwave dipole would give when receiving the same signal, then that antenna is said to have 3 decibels (dB) of power gain over a halfwave dipole, four times the output of the dipole would be 6 dB, and 10 times the output of the dipole would be 10 dB. When the reference antenna is a dipole, as in the situation just described, this is indicated by adding a "d" to "dB." Thus 3 dB of gain compared to a halfwave dipole would then be written as "3 dBd." Some typical gain figures for various antenna designs are given in table 1.

TABLE 1.
SOME TYPICAL ANTENNA GAIN VALUES
IN COMPARISON TO A HALFWAVE DIPOLE (dBd)

QUARTER WAVELENGTH GROUNDPLANE	-1.8
HALF WAVELENGTH DIPOLE	0
5/8 WAVELENGTH GROUNDPLANE	1.2
2-ELEMENT YAGI-UDA BEAM	5
8-ELEMENT COAXIAL COLLINEAR	6
4-ELEMENT YAGI-UDA BEAM	10
PARABOLIC DISH ANTENNAS	15-50

Directionality can be shown graphically by the antenna's directionality pattern. A directionality pattern is a graphic representation of the responsiveness of the antenna to signals arriving at the antenna from all directions of the compass. As is typical when comparing antennas for gain and

directionality, in table 1 the gain figures increase as the directionality increases. For instance the directionality pattern of the quarterwave groundplane (nondirectional and low gain) is circular, indicating equal responsiveness to signals in all directions or a lack of directionality (fig. 1). The halfwave dipole is a bit higher in gain than the groundplane and we find that it is also somewhat more directional. Its directional pattern is not circular but rather something like a fat figure eight (fig. 1), and it has two deep nulls (directions of minimal response) directly off its ends. The antennas with the highest gain levels are the dish antennas and their correspondingly high degree of directionality is shown by their cigar-shaped, highly directional patterns (fig. 1).



DIRECTIONALITY IN A NONDIRECTIONAL ANTENNA!

Three vertical antennas are listed in table 1: the quarterwave groundplane, the 5/8 wave groundplane and the 8-element coaxial collinear antennas. These vertical antennas all have nondirectional directionality patterns. This of course means that they are equally responsive to signals from any point of the compass. But there is a different way of viewing an antennas reception patterning: a cross section of it's response in the vertical plane. For instance, the quarterwave groundplane responds about equally to signals coming in from high angles (as from an aircraft or satellite), and signals coming at low angles (as signals from ground-based stations close to you do). But with the 5/8 wave, and even more so with the coaxial collinear, signals arriving at the antenna from high angles are not received so well, while signals at lower angles are received with more gain than is true for the quarterwave groundplane. This "vertical directionality" is an important aspect of antenna function and often will figure in your choice of antenna. For instance, for good all-around, nondirectional reception of ground-based stations the 5/8 wave antenna is very good and the collinear even better. On the other hand, if communication with aircraft or satellites is desired, the quarterwave with its greater responsiveness at higher angles might be desired. When high-angle signals are too weak for use of the quarterwave antenna, then we may decide to use a beam antenna with its higher gain and orient it at the angle of arrival of the desired signals.

ADDITIONAL FACTORS TO CONSIDER

In future columns we will be covering a number of factors that are important in antenna utilization and in selecting which scanner antenna to build or purchase. These factors will include signal propagation, signal polarization, antenna siting, transmission lines, lightning-induced damage protection, and signal-to-noise ratio considerations. Sometimes we will review available antennas and antenna-related products and, perhaps best of all, we'll also be telling you how to build some of today's most popular and useful scanner antenna designs.

USSN

New 1000 Channel Scanner From RS

Product Announcement

Radio Shack has replaced the PRO-2006 with a new model. The PRO-2035 is a more up-to-date scanner, with some new features and many of the old ones. Some of the new features are a Rotary Tuning Knob, Auto-Programing (whatever that is) and Weather Search. They have expanded the channel capacity to 1000 channels and the search-and-store channel capacity to 100. It still has their Hyper Scan and uses triple conversion. Frequency coverage is 25-520 MHz and 760-1300 MHz (minus cellular). It should be in our Radio Shack stores any time now, for "only" $449.99.

RAT SYSTEM

The Robbery Alert Transmitter, or RAT, system. What it is and how it works.

By George DuBois

Have the police cars in your city or town started to look like porcupines? Antennas sprouting up left and right? Fore and aft?

Of course, the patrol cars in a lot of cities have looked this way for years now, what with the proliferation of modern electronic communications devices such as MDT's, AVM (and other acronyms), the need for radios in different bands for communication with neighboring agencies, and of course, the ever popular cellular telephone in just about every car. But what are the three antennas, mounted in a triangle, in the center of the car roof? (See cover photo.) These are showing up in more and more cities. And to make matters worse, no one knows what they are, and no one will talk about them! Little has been reported in the scanner press. Even the editor of an East Coast monitoring magazine was recently asked about the new system in Tacoma, Washington, and had no idea what it was! And finding anything out on the local level? Forget it!

This has got to be the best-kept secret in scanning circles in years!!

What is it?

Well, what it is is a fairly sophisticated direction finding system, the latest weapon in the fight against the increasing incidents of bank robbery. The system is called the RAT SYSTEM, for Robbery Alert Transmitter system. More often it is called the "Tag" system. Instead of the simple exploding dye-pack some banks put in with the "take", a bank teller may now give the bandit a small transmitter, discretely inserted in a bundle of cash. The transmitter, or "tag", can be tracked, hopefully straight to the crook if he doesn't have time to find it first.

How does it work?

Well, there are three component parts. (Well, two actually, I'll explain in a second.) First is obviously the transmitter. It is a small, self-contained unit about the size of a credit card. It is placed within a bundle of cash and may be activated the same way dye-packs are. (Either manually, or by a radiating loop antenna placed near the bank exits.) The transmitter puts out a surprising amount of power and can be heard for miles. Moreover, the chemical battery used is quite powerful, and will run the unit for five to six hours at least. The signal is AM modulated and on a scanner is received as a low-pitched buzz.

The second component is the detection system which, as I hinted, is actually two parts. First is the fixed-location receiver system. These are receivers located throughout the city, tuned to the RAT transmitter frequency. They are usually co-located at the same sites as the transmitters used by the police departments regular two-way radio system (which only makes sense). Some agencies two-way radio systems use additional receive-only sites around a city to augment their system, particularly in the UHF bands, and RAT receivers can be located at these sites also. These receivers indicate the presence (obviously) and the strength of the RAT transmitter signal, which is relayed back to the departments' dispatch facility.

The third component, of course, is the mobile unit. This consists of the receiver tuned to the TAG transmitter frequency, the indicator unit, usually mounted on the cars dashboard, and the triangular-shaped antenna array on the roof of the vehicle.

The system is a phased array radio direction finding system, sometimes referred to as a Doppler shift direction finding system. In such a system, the antennas are electronically connected in such a way that as each one is sampled it simulates a single antenna rotating in a 360 degree circle. As it "looks" in the direction of a signal, the level of that signal increases. The equipment matches that increase with a known reference to determine direction.

The indicator unit mounts on the vehicle dashboard. It consists of a circular display, with another row of

LED's below the circle indicating the signals strength. This is a very simple design that allows a driver to see at a glance both the direction of the signal from him and its strength. A portable, hand-held receiver unit is carried in some vehicles, for close-in detection in crowds or other locations.

The mobile receiver units are not installed in EVERY vehicle. The usual configuration is to place enough units in cars so that there is a given number of units on the street at any particular time in each precinct. As you can surmise, this takes into account the fact that at any time a certain number of units will be out of service and unable to be called back into service quickly. You may also notice that most sergeants cars will have them too, including unmarked cars! The thinking here is that these cars are the LEAST likely to be tied up on calls, as a routine patrol car would be. They are quickly able to be alerted and pressed into service.

The System in Operation

The first thing you will hear on the ol' Bearcat is that a robbery has occurred. The dispatcher will then either indicate that a TAG transmitter was passed, or will simply ask all RAT units to switch to another channel (making it pretty obvious that one was). But occasionally they will not know this right away and will have to call the bank to find out if the transmitter was indeed passed. The units switch to another channel at this time because transmissions can become quite frequent and would pretty much tie up the dispatch channel completely.

The dispatcher will then issue broadcasts such as "Southeast is hot", or "North is cold", indicating that the TAG transmitter is (or is not) being received at those sites. (It's funny when they cross a bridge and "all sites are hot"!) These directions serve as an aid to locating the offender generally. His direction can also be predicted by which sites acquire the signal. This information is used to alert cars in the area where the signal is strongest, or in the area that it appears that he is headed. By positioning cars along arterial streets, one or more officers is usually then able to acquire the signal on his or her car receiver and is able to give the direction from them, along with its strength. ("One light, north of me", "three lights", etc.)

If the vehicle was stationary it would be a simple matter. One car could track the transmitter down, using the direction and signal strength indications. Because he will usually be moving however, a number of cars are required. As they relay the information displayed on their dashboard indicator units, the cars can usually determine the bandits direction, speed and probably even the street he might be using, if he is in an area where he is likely to be sticking to the main arterials. If they are fast and efficient, they can catch the bad guy in short order.

The handheld tracking unit comes into play in a number of instances. The unit is very sensitive, although the sensitivity can be turned down to help "home in" on the signal source. Officers can go up to an apartment building, walk up and down the halls and narrow the signal right down to an apartment.

The Need for Secrecy

Ask a patrolman about the weird antennas or the "thingie" on his dash and you will most likely be met with either silence or something to the effect that he "can't talk about it". Calls to local officials will yield you little or no additional information. Call

A "RAT" Story

There are a million stories in the naked city. A good portion of them are true. Many are exaggerated to a great extent. And many are downright lies and tall tales. This story supposedly falls into the first category. It made the rounds of the various precinct locker rooms. We can't attest to its truthfulness.

When the Robbery Alert Transmitter system here in Portland, Oregon was first installed and tested and finally placed in service about four years ago, the very first bank holdup was in the North section of town, an area of modest homes and lower middle-class incomes.

Within minutes of the alarm, responding units had narrowed the location of the RAT transmitter down to a three or four block area and shortly thereafter were able to narrow it down further, with the likely location of the transmitter, and the accompanying suspect, in a neighborhood bar.

Two officers went into the bar, one of them carrying the handheld receiver / indicator unit used for close-in detection of a RAT transmitter. One of the officers walked slowly down the length of the bar, behind the seated patrons. As he walked by one of them, the indicator unit started flashing. He kept on walking to the end of the bar, turned around and started to walk back again. A couple of the customers had observed what had happened and as calmly as possible gradually moved **away** from the particular individual. As the officer walked back down the row of barstools, the indicator unit again went off as he passed by the same gentleman.

At this point the officer confronted the man. "Excuse me, sir, have you ever worked at Three Mile Island?", he asked. (Imagine the apprehension **this** must have caused the other customers!) "No", he is alleged to have replied. "In that case," the officer said, "you're under arrest for suspicion of bank robbery."!

City Hall? They won't talk about it either.

They want this system kept under wraps, the main reason being to keep the crooks from finding out about it. Most agencies even remove the indicator units from the dashboards of their cars when they are not in use, just to keep them out of sight of inquiring eyes.

But our tax money paid for it! Well, not really. According to what we've been told, the money comes from a variety of sources, many times federal grants. Portland, Oregon, for example, has had a very high bank robbery rate for a number of years now, making it a likely candidate for the system that was installed four years ago. Yet it appears that it was funded with a combination of federal money and money contributed by the state Banking Association (from what I was told). For that reason you won't get a thing out of City Hall! If no local tax money was spent, they are under no obligation to tell you a thing, even under any state disclosure or freedom of information regulation. So there!

The Frequencies

The frequencies used by the TAG transmitters will likely be found in the 216 to 220 MHz band, usually at the higher end. This band is sort of an "orphan", having been divvied up between a number of services over the last ten years. The band used to be allocated generally for Fixed and Mobile use, plus Radiolocation. The Mobile use was expanded to the Maritime Mobile service at the 1979 World Administrative Radio Conference. That was when the band was allocated for the Automated Marine Telecommunications Service. Until then mobile use was limited to low power telemetry, for both wildlife tracking (in the lower portion of the band), and data telemetry from ocean buoys and similar uses. Shared, non-Government use was also permitted. Radiolocation use consists of a Navy radar system in the Southeast and Southwest part of the country. Besides AMTS, another portion of the band at 218 MHz is used by the new Interactive Video Data Service.

The secondary allocation for telemetry and telecommand still remains, including use by non-Government entities. Under a VERY broad definition of the rules, these DF systems MIGHT qualify. But this doesn't really matter, since you won't find a license for a system anywhere. They are either licensed to the Federal Government or, quite possibly, not licensed at all!

The system here locally operates on 219.96 MHz. There was a one-time mention of these systems in the RCMA newsletter a couple of years ago, and it was indicated that this particular system (in Nevada) operated in the 460 MHz UHF band. We are not able to confirm this and, frankly, doubt it. In any case, if you know a system is in use in your area, you can easily determine this by looking at the antenna length.

There have been reports that the system is being used for general tracking uses. This seems questionable. There would always be the risk that there would be a bank robbery in the same area, impeding operation of the whole system.

When is the best time to search to find the TAG transmitter frequency? That's easy. When they first install the system. During this period they do extensive testing. And when the system is finally operational, they will spend many weeks training officers in the use of the system. A car will drive around with a TAG transmitter activated, the dispatcher will relay "hot" sites, all just like the real thing.

If the system is already on the air, you'll just have to search when you know a transmitter is activated. If there is a robbery near you and the dispatcher says a transmitter was passed, start searching. I would recommend starting at 220 MHz and search DOWN in frequency, in 5 kHz steps. The transmitter is modulated with a slight buzzing sound. Whatever you do, DON'T go driving down to the bank just to get closer to the signal (or the crook)!

Another good time to search is when they are training, which they will do periodically. This training is essential for maintaining proficiency. Whenever a transmitter is activated for real, you will notice that the responding cars will probably always go to the same channel for the tracking operation. They will most likely use this same channel for training. If that's what it sounds like you are hearing, start searching. Remember, the transmitter can be heard for miles, don't worry about being all that close. You are only asking for trouble. (Although if you are SURE that it's only a training exercise, the risk is obviously not all that great.)

In any case, there's no real reason to find the frequency. It's just that if you are like me, you spend a good deal of time and effort tracking down obscure frequencies like this one. If you don't find it, it's no big deal. The main thing is that you now know what those extra antennas on the police cars are for. And, like me, hopefully you'll feel a little better knowing that your local police are using the latest in advanced technology in their battle against crime.

USSN

Note...

We had a few qualms about printing the frequencies used, but then thought, what the heck? What good are they going to do anyone? The crook isn't going to be monitoring that frequency. If he's smart enough to know about the system, the first thing he's going to do is toss the transmitter out. (Or into the back of a passing pickup!) And if we didn't print it, I pictured every ambulance-chasing moron with a scanner running around town chasing cop cars while searching for the frequency. (You know, the types who don't stay home and listen like they should, but like to go out and get in the way.) So take our advice, stay home and listen. Bank robbers are almost always fairly dangerous individuals. Wait until there is a robbery near you, then search for the frequency at home. Trust me, the transmitter can be heard for miles. This is the wisest course of action and will allow you to live to scan again another day!

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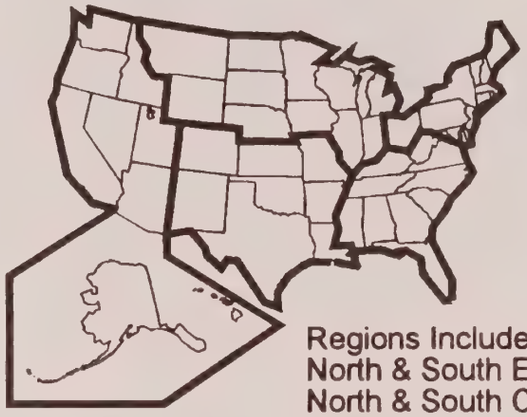

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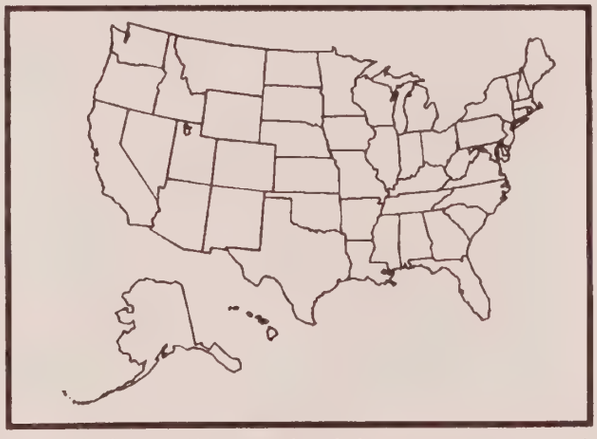

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BEGINNER'S CORNER

Is your local Police Department going to trunking? It's not the end of the world!

TRUNKING AND ENCRYPTION SYSTEMS

by Chuck Gysi, N2DUP

If your local police department is about to move to a new band, that doesn't necessarily mean you won't be able to hear them anymore! Scanner listeners often send me letters with clippings of newspaper articles where the reporters perpetuate myths about how the public can't tune in police transmissions anymore (am I the only person in the news industry who understands radio communications?).

The culprit of all these articles in cities from Indianapolis to San Diego to Denver and many in between is 800 MHz trunking systems. Many cities, counties and states have been sold -- lock, stock and barrel -- on the newfangled radio communications that makes obsolete transmissions that until now are carried out on assigned channels on a routine basis. What trunking does is set aside a group of 5 to 20 channels or more and assigns frequencies as they are needed by agencies. Thus, a city's police, fire, ambulance, rescue and municipal operations such as sanitation, streets, health, animal control and more, all can operate on the same frequencies without stepping on each others' toes.

Newspaper articles perpetuate myths about how the public can't tune in police transmissions anymore.

At each repeater site is a computer that identifies each unit as it transmits and assigns it to one of the available repeater frequencies within the licensed group. Not only does it carry out that task, but it also automatically sends out a data signal that instructs all other units in the same fleet to tune their radios to the exact same frequency.

For instance, the controller at the radio site may pick up a detective that is ready to transmit. The computer assigns it to a frequency, such as 856.7125 MHz. At the same time, it will assign radios used by all other detectives in the same group to tune to the same frequency so they hear the message. The groups may even be broken down into further subfleets, too. For instance, within the detective group may be a subfleet that handles communications for North and South detectives, and maybe even vice units. The detective tells his or her radio (by what might be called a channel selector, usually an alphanumeric readout that says something like DET-SOUTH), what group or subfleet he or she wants to communicate with and the controller at the tower site does the rest. If the detective wants to communicate with a vice unit, the controller will make sure all vice units hear his or her message.

Likewise, patrol units may have their radios set up so that they cannot hear communications from internal affairs, for instance. That would create a problem, of course. In fact, patrol units may have their radios organized so they can communicate only with dispatchers and other patrol cars. On the other hand, they also may be configured so that a mutual aid group is set up, so a patrol car can call a responding ambulance to advise paramedics directly of a patient's condition.

In most trunked systems, the frequency used by the various groups changes each time the microphone is pressed, or at least waits until the end of a conversation. Following trunked communications takes a bit of patience, especially when you want to listen only to emergency services and now you have everyone from the mayor to garbage trucks and ambulances all using the same frequencies day in and day out. Everybody seems to have their own tricks for listening to trunked conversations, and you'll have to experiment yourself if your city or region goes to this system.

In the trunked systems that some cities are installing, digital encryption is being used by police services. Thus, all you can expect to hear is what sounds like a rush of static over your radio each time a law officer transmits to other units. It can be annoying, but you'll need to determine whether the encryption is being used on a full-time basis or only selectively by certain units. For instance, trash trucks don't have much need for encryption; however, detectives working a drug bust probably do. If the police department uses encryption on a full-time basis for all communications, you are out of luck, unless you happen to work for the news media. In these cities, the police usually have provided a trunked radio to each newsroom so that their conversations can be eavesdropped on by assignment editors. You can bet the juicy groups, like drug and vice units, won't be programmed into these news radios. And the radios usually aren't offered to the news media until after they start complaining about the right to know in news columns.

" An 800 MHz capable scanner would cost $2,500 and the frequencies used by the police aren't available to the public."!

The biggest problem I find when cities go to trunked dispatching systems is the myths they toss to reporters who don't know a megahertz from a low band. The clippings that I get from each city show the reporters only regurgitate the facts that the communications supervisors usually tell them. One reporter with a re-

spected western newspaper actually was told that an 800 MHz capable scanner would cost $2,500 and that the frequencies used by the police aren't available to the public! A quick call to the local scanner shop would have recast those lines he was fed.

I've seen only one reporter who actually checked out another source in such a story, and found out that, indeed, it was possible to monitor trunked radio communications with certain techniques in mind. In the meantime, however, news reports will continue to perpetuate tales about how all scanners in a city have become obsolete with the overnight toss of a switch. An enterprising reporter might actually do a sidebar story for his or her readers telling the scanner jockeys how they can tune in trunked transmissions, even if it means something as simple as adding an 800 MHz converter to their scanner, or buying a new scanner that includes the 800 MHz band. Sure, it will cost more than $59.99 at the local Wal-Mart, but it's the price you pay for advancing technology. Long-time scanner users might even remember back when scanners only had one or two bands. Having a UHF scanner was something of a luxury at one time!

In the meantime, cities such as Denver, Colo., State College, Pa., Iowa City, Iowa and others have switched to trunked 800 MHz systems. The thing to remember is that if your local department switches to 800 MHz, don't give up listening to the old frequencies. While some 800 MHz frequencies require the licensee to surrender to the Federal Communications Commission its lower frequencies, some do not. Thus, the old frequencies might be used on an occasional basis (after all, the equipment still may be hanging around station houses), or another surrounding town may get FCC permission to start using the agency's former lower frequencies. Tune in those trunked systems -- they aren't as hard to hear as you might imagine. And don't forget to unlock those data channels after they switch frequencies. You'll know what I'm talking about if you try to hear trunked systems. The data channel sends out the tuning instructions to each radio in the fleet so they know which group to tune in.

800MHZ PUBLIC SAFETY ALLOCATIONS

(Available to stations located over 87 miles from the Canadian / U.S. Border)

Single Channels (Conventional Systems)

854.9625	855.2125	855.4625	855.7125	855.9625
854.9875	855.2375	855.4875	855.7375	855.9875

Trunked Channels

856.2125	857.2125	858.2125	859.2125	860.2125
856.2375	857.2375	858.2375	859.2375	860.2375
856.2875	857.2875	858.2875	859.2875	860.2875
856.4375	857.4375	858.4375	859.4375	860.4375
856.4625	857.4625	858.4625	859.4625	860.4625
856.4875	857.4875	858.4875	859.4875	860.4875
856.7125	857.7125	858.7125	859.7125	860.7125
856.7375	857.7375	858.7375	859.7375	860.7375
856.7625	857.7625	858.7625	859.7625	860.7625
856.9375	857.9375	858.9375	859.9375	860.9375
856.9625	857.9625	858.9625	859.9625	860.9625
856.9875	857.9875	858.9875	859.9875	860.9875

DVP Dope

To this day, I still don't see much digital encryption used outside the federal government. Sure, some sheriff's departments and vice units in larger cities and even smaller rural counties will use it, but you won't find it used on a full-time basis by any department (with one exception that I know of). Even on the federal channels, you find that perhaps even as much as half the communications are not encrypted, perhaps because the user doesn't know how to activate it. For instance, often you hear one side of the conversation in the clear while the other side is encrypted. Over the past dozen or more years, I have heard reports that so-and-so has come up with a way to decode or bust digital encryption, but to this day, I have yet to see it being done. Certainly, if someone really wanted to make a few bucks, he'd market such knowledge.

Remember those voice-inversion descramblers that you used to be able to purchase mail order to decode such transmissions? Well, since the Electronics Communications Privacy Act of 1986 was enacted, they've all dried up. It's illegal to make available such a device now. Surely, the same case would apply to a unit capable of deciphering digital encryption. For the most part, most of America will continue to use two-way radio as it has for the past 40 years. And that means there will continue to be a demand for basic scanners capable of hearing those calls. Plus, no merchandiser would be able to sell equipment that could decipher digital or encrypted conversations.

800MHZ PUBLIC SAFETY ALLOCATIONS

(Available to stations within 87 miles of the Canadian / U.S. Border)

851.0125	851.7625	852.5125	853.2375	854.0125
851.0375	851.7875	852.5375	853.2625	854.0375
851.0625	851.8125	852.5625	853.2875	854.0625
851.0875	851.8375	852.5875	853.3125	854.0875
851.1125	851.8625	852.6125	853.3375	854.1125
851.1375	851.8875	852.6375	853.3625	854.1375
851.1625	851.9125	852.6625	853.3875	854.7625
851.1875	851.9375	852.6875	853.4125	854.1875
851.2125	851.9625	852.7125	853.4375	854.2125
851.2375	851.9875	852.7375	853.4625	854.2375
851.2625	852.0125	852.7625	853.4875	854.2625
851.2875	852.0375	852.7875	853.5125	854.2875
851.3125	852.0625	852.8125	853.5375	854.3125
851.3375	852.0875	852.8375	853.5625	854.3375
851.3625	852.1125	852.8625	853.5875	854.3625
851.3875	852.1375	852.8875	853.6125	854.3875

If they did, they might last hours before the Justice Department would be pounding at (or breaking down) the front door.

Sure, I've seen the Motorola units that program DVP-capable radios (DVP is Motorola's trademark for Digitial Voice Encryption) being sold at hamfests. But having the "key" doesn't mean one can unlock the secret. There are billions of codes and it really isn't worth the effort to try to decode such a large possibility of a number.

Scanners probably won't be able to advance with the technology because of cellular lobbyists who ramrod through Congress silly laws that rarely ever are enforced. And they aren't about to stop either. Sure, some manufacturer may offer a scanner that can follow trunked communications of interest, but keep in mind that there are several manufacturers' protocols for trunked systems on the market and a scanner manufacturer would have to obtain patent rights to offer each possibility in its scanner (in other words, forget about this happening).

In the meantime, we've got to learn to live with what we have and use it to the best of our abilities. Share your listening tips with others. No, one person won't make a difference, but numbers will. If scanner users had organized themselves better, the cellular lobbyists wouldn't have gotten their laws into effect in the first place. So, don't sit there. Do something constructive for the hobby. And don't give up listening. There's plenty to hear out there. Just keep searching.

Write On

This is the first beginners corner of sorts here at U.S. Scanner News. In this issue, we explored trunking and DVP and the effect on scanners. However, we welcome your questions related to scanning. If you want the straight truth on something about scanning, send in your question. If something about the hobby just bugs you because you don't know where to turn for answers, consider Beginners' Corner your source.

Send your questions directly to the author at: Chuck Gysi, N2DUP, U.S. Scanner News Beginners' Corner, P.O. Box 911-US, Burlington, Iowa 52601-0911, or E-mail via the Internet at scan911@aol.com.

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AVIATION

Roger West Starts off his first column with a look at various jump zones around the country.

Parachute Jumping/Sky Diving

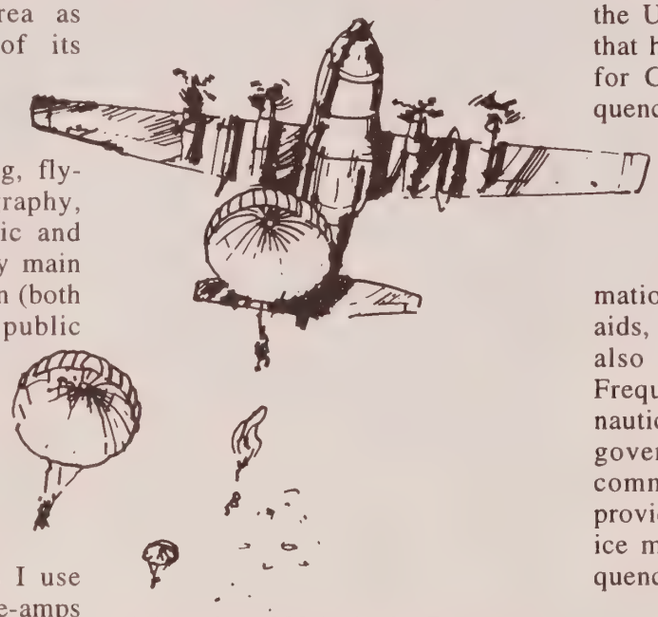
by Roger West

Hello scanner enthusiasts! I have been selected by the people at U.S. Scanner News to be the Aviation Column Editor. To start this column off I would like to give you a little background about me.

I am married and we have 4 children. Three live here in Wisconsin near us and one lives in Germany. We live in Northwestern Wisconsin, out in the country, on the Apple River. We refer to this area as "God's Country" because of its beauty. Some of my many interests and hobbies are: spending a lot of time with our grandchildren (10), monitoring, flying, fishing, writing, photography, gardening, meteorology, music and much much more fishing! My main monitoring interests are aviation (both civilian and military) and public safety. I have been monitoring for more years than I care to count, and I have a pretty good array of equipment. I have five scanners, the Pro 2004, 2005, 2006, Bearcat 200XLT and the AR 1000 Handheld. With my scanners I use several different brands of pre-amps because we live out in the country, and I also use 2 antennas, a Discone and a home made aviation antenna, and I am now in the process of making several more antennas. I am a member of many monitoring clubs, and I subscribe to several monitoring magazines.

I would like to hear from you, the readers, as to what aviation frequencies you are monitoring so we can share them with all the readers. I would also like for you to send me any monitoring experiences, such as aircraft emergencies, and if you see an article on aviation in the newspaper or a magazine that you feel would be of interest to the other aviation monitors, please send it in. I will write back to you letting you know that I did receive the information that you took the time to send in.

For my first column I am going to list the known sites for Parachute jumping and Sky Diving activities. This information was obtained from my many aviation manuals published by the National Ocean Service, National Oceanic and Atmospheric Administration (NOAA), the Department of Commerce and are published in accordance with specifications and agreements approved by the Federal Aviation Administration (FAA) and the Department of Commerce. Most listed activities are conducted during daylight hours and under VFR (Visual Flight Rules) conditions. The busiest periods of activity are usually on the weekends and holidays, but activity can be expected during the week as well. Here in Polk County, Wisconsin they start at about noon and go until dark. The (c) indicates that the parachute jump area is charted. To qualify for charting a jump area must meet the following criteria: (1) Been in operation for least one year. (2) Operate year round (at least on the weekends). (3) Log 4,000 or more jumps each year. In addition, jump sites can be nominated by the Federal Aviation Administration (FAA) regions if special circumstances require charting.



After each site listing is the CTAF or Unicom frequency that is probably being used by the pilot carrying the Parachute Jumper/Sky Divers. Usually the pilot will use the CTAF or the Unicom Frequency of the airport that he/she is using. C T A F stands for Common Traffic Advisory Frequency, which is a program designed to get all ground vehicles and all other aircraft in the area on a common frequency and it is also a way for Flight Service Stations (FSS) to provide information on airport conditions, radio aids, and other facilities, plus they also process flight plans. Unicom Frequencies (also called an Aeronautical Advisory Station) is a non-government air/ground radio communications facility utilized to provide general airport advisory service much the same as the CTAF frequencies do.

If a frequency is not listed after the site name you can usually catch the action on one of the following frequencies: 122.700, 122.800, 122.725, 122.850, 122.900, 122.950, 122.975, 123.000, 123.050 or 123.600 or, at military sites, check out the following frequencies: 126.200, 134.100, 236.600, 257.800, 285.400, 363.800 if it is the Air Force. For the Army check out 32.10, 37.00, 38.90, 41.50, 41.80, 46.70, 126.200, 241.000 or 229.600. If a Naval or Marine Corps facility check out 41.95, 126.200, 340.200 or 360.200.

If more than one aircraft is used, the pilots communicate with each other on frequencies between

122.00 to 124.000. Some of the most popular frequencies used for these communications are: 122.750, 123.400, 123.450* or 123.500.

* - 123.450 MHz is an unofficial pilot-to-pilot frequency and it makes for some rather interesting monitoring. Usually if I cannot sleep I will get up and tune into this frequency and between about Midnight and 6 am it makes for some very interesting monitoring!)

All aircraft frequencies are in the AM MODE with the exception of frequencies from 32.00 to 47.00 MHz, while are in the FM MODE.

When I was younger (much younger) and before I suffered 2 strokes at the age of 47 I used to skydive a lot with are two oldest sons. I hope to make another jump after finishing up having the surgery on my legs (which is stroke related).

So, bring your scanner, sun glasses, binoculars and perhaps a cooler with your favorite beverage and get set to sit back and watch all the action of this great sport!

JUMP ZONES

NOTE: C=indicates that the parachute jump area is charted. To qualify for charting, a jump area must meet the following criteria:

(1) Been in operation for at least 1 year.

(2) Operate year round (at least on the weekends).

(3) Log 4,000 or more jumps each year.

In addition, jump sites can be nominated by the Federal Aviation Administration (FAA) Regions if special circumstances require charting.

STATE OF ALABAMA

	Albertville Muni-Thomas J.Brumlik Field	123.000 C/U
	Allen Army Heliport	
(C)	Bayou La Batre, Roy E.Ray Airport	122.900 C
	Bassemer, Old Bessemer Airport	123.000 C/U
(C)	Dotham, Hatch Army Heliport	
(C)	Elberta, Horak Airport	
	Ellis Drop Zone	
	Eutaw Muni.Airport	122.900 C
	Gadsden Muni.AIrport	122.800 C/U
	Harvest, Epps Airpark	
	Hazel Green	122.800 C/U
	Headland Muni.AIrport	122.900 C
	Jones Drop Zone	
	Kilby Drop Zone	
	St.Claire County Airport	122.800 C/U
	Pinson, Industrial Park	122.700 C/U
	Redstone Drop Zone	
	Renda Drop Zone	
(C)	St.Elmo	122.900 C
	Tac Runkle Drop Zone	
	Tommy Drop Zone	
	Tuskegee, Moton Field	122.800 C/U
	Vincent	
	Warrior	
	Weaver, McMinn Airport	122.800 C/U
(C)	Wetumpka Muni.	122.800 C/U

STATE OF ARIZONA

(C)	Avra Valley	123.000 C/U
(C)	Buckeye Muni.Airport	122.800
(C)	Coolidge Muni.Airport	122.800 C/U
(C)	Elroy Muni.AIrport	122.800 C/U
(C)	Estrella Sailport	122.900 C
(C)	Laguna AAF/Yuma Proving Ground	127.650 C
(C)	Marana, Pinal Airpark	123.050 C/U
	Phoenix, U.S. Parachute Training Area	

STATE OF ARKANSAS

	Black Jack Drop Zone	
	Camp Chaffee, Arrowhead Drop Zone	
	Camp Robinson Drop Zone	
	Conway Drop Zone	
	Hazen Muni.Airport	122.800 C/U
	Texarkana	125.700 C

STATE OF CALIFORINA

(C)	Byron Airport	123.050 C/U
(C)	California City Muni.Airport	122.700 C/U
(C)	Corning Muni.Airport	123.000 C/U
(C)	Elsinore, Skylark Field	
(C)	Hemet/Diamond Valley	123.000
	Hemet-Ryan Field	123.000 C/U
(C)	Hollister Muni.Airport	123.000 C/U
(C)	Livermore Drop Zone	
	Lodi Airport	122.900 C
(C)	Los Alamitos Army Airfield	
(C)	Madera Muni.Airport	122.800 C/U
(C)	March Air Force Base	
(C)	Marina/Ft.Ord. Fritzsche Army Airfield	
(C)	Mendota Airport	122.900 C
	Marrieta, Bear Creek Airport	122.900 C
(C)	Oro Loma, Eagle Field	
	Palm Springs	
(C)	Paso Robles Muni. Airport	123.000 C/U
(C)	Perris Valley Airport	122.900 C
(C)	San Diego, Leon Drop Zone	
(C)	San Diego, Otay Reservoir	
(C)	San Diego, South Bay	
(C)	San Diego, Trident	
	Santa Maria	122.950 U
	Santa Rosa, Sonoma County Airport	122.950 U
(C)	Taft Drop Zone	
(C)	Tres Pinos Drop Zone	
(C)	Twentynine Palms	
(C)	Wilton Drop Zone	
(C)	Winters/Davis/Woodland, Yolo County	123.000 C/U

STATE OF COLORADO

(C)	Calhan Airport	122.800 C/U
(C)	Colorado Springs, USAF Academy	122.950 U
(C)	Fort Collins, Loveland Muni.Airport	122.700 C/U
(C)	Frederick Firestone Airport	
(C)	Rifle, Garfield County Regional Airport	122.800 C/U
	Steamboat Springs/Bob Adams Field	122.800 C/U

STATE OF CONNECTICUT

	Cheshire	
(C)	Ellington Airport	123.000 C/U
	Harwinton	
(C)	Woodstock	

STATE OF DELAWARE

	Dover Air Force Base	
	Georgetown, Sussex County Airport	123.000 C/U
	Selbyville, Warington Field	

STATE OF FLORIDA

	Avon Park Muni.Airport	122.800 C/U
	Brandon, Sod Farm	
(C)	Bunnell, Flagler County Airport	123.000 C/U
	Chassahowizka Drop Zone	
(C)	Clewiston, Airglades Airport	122.800 C/U
(C)	Deland Muni-Sidney H.Taylor Field	122.800 C/U
	Englewood, Buchan Airport	122.900 C
(C)	Homestead	122.800 C/U
(C)	Homestead Air Force Base #2	122.800 C/U
	Keystone Airport	122.700 C/U
	Key West	122.950
(C)	La Belle, Sundance Farms Airport	122.800 C/U
	Lake Wales	122.800 C/U
(C)	McDill Air Force Base	
(C)	Myakka City	
	New Smyrna Beach, Massey Ranch Airport	122.800 C/U
(C)	Palatka, Kay Larkin Airport	122.800 C/U
(C)	Quincy Muni Airport	122.700 C/U
	St. Augustine	122.800 C/U
	Shell Creek Airpark 122.900 C	
	Sun City	
(C)	Titusville, Arthur Dunn Air Park	123.000 C/U
(C)	Umatilla Muni Airport	122.900 C
	Willston Muni.Airport	122.800 C/U
(C)	Zephyhills Muni.Airport	122.800 C/U

STATE OF GEORGIA

	Atlanta Skydiving Center	
	Bunker Hill Drop Zone	
	Claxton-Evans County Airport	122.800 C/U
(C)	Dahlonega, Lumpkin County Airport	122.900 C
	Dahlonega Highway 76 Drop Zone	122.900 C
(C)	Ellijay, Gilmer County Airport	123.000 C/U
	Fort Benning, Box Spring Drop Zone	
	Fort Benning, Elbert Drop Zone	
(C)	Fort Benning, EuBanks Drop Zone	
(C)	Fort Benning, Fryar Field Drop Zone	
(C)	Fort Benning, Gardner Drop Zone	
	Fort Benning, Lawson Army Airfield	
	Fort Benning, Lae Drop Zone	
	Fort Benning, Ledo Drop Zone	
	Fort Benning, McKenna Drop Zone	
(C)	Fort Benning, York Drop Zone	
	Fort Valley, Miami Valley Farms Airport	
	Hinesville, Liberty County Airport	122.800 C/U
	Locust Grove, Garden of Eden	
	Plantation Airpark, Moore Drop Zone	122.800 C/U
(C)	Rome, Richard B.Russell Airport	123.000 C/U
	St.Marys Airport	122.800 C/U
	Tifton, Henry Tift Myers Airport	122.700 C/U
(C)	Warm Springs, Rossevelt Memorial	122.900 C
	Waycross-Ware County Airport	122.800 C/U
	Wilscott Drop Zone	

STATE OF IDAHO

(C)	Athol Airport	122.700 C/U
(C)	Athol, Silverwood Airport	122.700 C/U
(C)	Blackfoot, Anderson Field	122.800 C/U
(C)	Boise, Star Parachute Ranch	
	Burley	123.600 C
	Caldwell Industrial Airport	122.800 C/U

STATE OF ILLINOIS

	Annawan, Thompson Airport	
(C)	Carmi Muni Airport	122.800 C/U
	Deer Grove	
	Greenville Airport	122.800 C/U
(C)	Hinckley Airport	122.900 C
(C)	Minier, Illinois Valley Parachute Club	123.000 C/U
(C)	Ottawa, Ottawa Airport	122.700 C/U
	Sterling	
	Tampico	
(C)	Taylorville, Taylorville Muni.Airport	122.800 C/U
(C)	Vandalia, Vandalia Muni Airport	122.800 C/U
	Wapella Thorp	122.800 C/U

STATE OF INDIANA

(C)	Anderson, Ace Park	122.800 C/U
	Cloverdale, Swope Airstrip	
	Elkhart, Midway Airport	122.950 U
		OR 122.900 C
(C)	Frankfort, Frankfort Muni Airport	123.000 C/U
	Franklin, Franklin Flying Field	122.700 C/U
	Goshen, Goshen Mini Airport	123.000 C/U
	Kingsbury	
(C)	Mentone	122.900 C
	Munice, Horizon Field	122.700 C
		122.950 U
	Ramsey	
(C)	Richmond Muni Airport	
	Shelbyville	
(C)	Tocsin, The Lazy K Airport	
	Veederburg, Songer Airport	

STATE OF IOWA

	Cedar Rapids	122.950 U
(C)	Cherokee Muni Airport	122.950 U
(C)	Dallas Center, Husband Field	
	Davenport	123.000 C/U
	Decorah Airport	122.800 C/U
(C)	La Porte City, Nicohles Airport	122.900 C
	Muscatine Muni Airport	122.700
(C)	New Hampton Muni Airport	122.900 C
(C)	Northwood Muni Airport	122.900 C
	Perry Muni Airport	122.800 C/U
	Sioux City	**122.800 C/U**
(C)	Vinton Veterans Memorial Airpark	122.800 C/U
	Waterloo, Ranch Aero	
(C)	Winsterset-Madison County Airport	

STATE OF KANSAS

	Atchison, Amelia Earhart Airport	122.800 C/U
	El Dorado, Captain Jack Thomas	122.800 C/U
	El Dorado Airport	122.800 C/U
	Garnett, Garnett Muni Airport	122.800 C/U
(C)	Jetmore Muni Airport	122.700 C/U
(C)	Junction City, Ft.Riley, Marshall AAF	
(C)	Lyons-Rice County Muni Airport	122.800 C/U
(C)	Oxford Muni Airport	122.900 C
	St.Francis, Cheyenne County Airport	122.800 C/U
	Salinas	122.950 U
(C)	Topeka, Mesa Verde Airport	
	Udal, Cherokee Strip Airport	
(C)	Wamego Muni Airport	122.900 C
	Wichita, Maize Airport	122.900 C
(C)	Wichita, Sauerman Field	

STATE OF KENTUCKY

	Bardstown, Samuels Field	122.800 C/U
(C)	Berea-Richmond Airport	122.900 C
	Elkton, Standard Field	122.900 C
(C)	Flemigsburg, Fleming Mason Airport	123.000 C/U
	Ft.Campbell, Bastogne Drop Zone	
	Ft.Campbell, Corregidor Drop Zone	
	Ft.Campbell, Los Banos Drop Zone	
	Ft.Campbell, Suckchon Drop Zone	
	Fort Knox	
	Glasgow Muni Airport	122.800 C/U
(C)	Greenville, Muhlenberg County Airport	123.000 C/U
(C)	Hopkinsville-Christian County Airport	122.800 C/U
	Owensboro, Windy Hollow Drag Strip	122.950 U

STATE OF LOUISIANA

(C)	Baton Rouge	122.950 U
(C)	Belle Chasse	
	Bodcaw	
(C)	Breaux Bridge, Bordelon Airpark	122.900 C
(C)	Gilliam Airport	
	Gonzales, Pete Denham Airport	122.900 C
(C)	Hammond Muni Airport	123.000 C/U
(C)	Jeanerette, Lemaire Memorial Airport	122.900 C
	Mansfield, De Soto Parish Airport	122.800 C/U
(C)	Opelousas, St.Landry Parish Airport	122.800 C/U
	Ahart Field	
(C)	Pollock Airport	122.800 C/U
(C)	Ruston Muni Airport	122.700 C/U
	Shreveport	122.950 U

STATE OF MAINE

(C)	Bethel, Col.Dyke Field	122.900 C
(C)	Lebanon	
	Millinocket Muni Airport	122.800 C/U

STATE OF MARYLAND

	Accident	
(C)	Chesapeake Bay	
	Edgewood	
	Farmington Airport	
	Gambrills, Dairy Farm	
(C)	Leonardtown, St.Marys County Airport	123.000 C/U
	Long Green Drop Zone	
(C)	Ocean City Muni Airport	122.800 C/U
	Patuxent River Naval Air Station (Trapnell Field)	
	Sumang Drop Zone	
	Tewey Drop Zone	
	Unity Drop Zone	

STATE OF MASSACHUSETTS

(C)	Ft.Devens, Turner Drop Zone	
(C)	Montague, Turners Falls Airport	123.000 C/U
	Natick Laboratory Sudbury	
(C)	Northampton	122.700 C/U
(C)	Pepperell, Sports Center Airport	

STATE OF MICHIGAN

	Cedar Springs	
(C)	Fowlerville Maple Grove	122.800 C/U
(C)	Hasting	122.800 C/U
(C)	Marine City Airport	123.000 C/U
	Marshall, Brooks Field	122.800 C/U
(C)	Napoleon Airport	122.900 C
(C)	Sturgis, Kirsch Muni Airport	123.050 C/U
(C)	Tecumseh, Al Myers Airport	122.900 C

STATE OF MINNESOTA

	Duluth	122.950 U
		OR 122.800 C/U
	Minneapolis	123.000 C/U
		123.050 C/U
		122.950
	Owatonna Muni Airport	122.700 C/U
(C)	Stanton, Stanton Airfield Airport	122.800 C/U

STATE OF MISSISSIPPI

	Artesia, Carson Drop Zone	
(C)	Batesville, Panola County Airport	122.800 C/U
	Coldwater, Colorado Drop Zone	
	Edwards, Kelly Drop Zone	
	Edwards, Noble Drop Zone	
	Magee Drop Zone	122.800 C/U
	Strong	
	Terry, Windy Drop Zone	
	West Point, King Drop Zone	122.900 C

STATE OF MISSOURI

(C)	Bowling Green Muni Airport	122.800 C/U
(C)	Harrisonville, Lawrence Smith Airport	123.000 C/U
	Independence Memorial Airport	122.800 C/U
(C)	Lexington Muni. Airport	122.700 C/U
	Charleston, Mississippi County Airport	122.900 C/U
	Neosho	122.800 C/U
(C)	Sikeston Memorial Muni Airport	122.800 C/U

STATE OF MONTANA

	Bozeman Gellatin Field Airport	122.950 U
(C)	Butler Creek	
	Dornblaster Field	
(C)	Grant Creek	
(C)	Helena	122.950 U
	Kalispell City Airport	122.800 C/U
	Laurel Muni Airport	122.800 C/U
(C)	Missoula International Airport	122.950 U
	Ninemile Creek	
(C)	Raser Ranch	
	Roundup Airport	122.800 C/U
(C)	Stevenville Airport	122.800 C/U
	Stoney Creek	
	University Campus	
	West Yellowstone, Yellowstone Airport	122.800 C/U

STATE OF NEBRASKA

(C)	Crete Muni Airport	122.800 C/U
(C)	Eagle Field Airport	122.900 C
	McCook Muni Airport	122.800 C/U
(C)	Minden, Schmidt Airport	122,700 C/U
(C)	Weeping Water, Browns Field	122.900 C

STATE OF NEVADA

(C)	Boulder City Jump Zone	122.700 C/U
	Indian Springs Air Force Auxiliary Airport	
(C)	Los Vegas, Craig Road Drop Zone	122.800 C/U
		OR 122.950 U
	Pahrump	122.900 C/U
	Reno/Stead Airport	122.800 C/U
(C)	Cal Nev Ari, Kidwell Airport	122.900 C/U

STATE OF NEW JERSEY

(C)	Chatsworth, Coyle Field	
	Colts Neck	123.000 C/U
(C)	Lakehurst Naval Air Engineering Station	
(C)	Lakewood Airport	122.800 C/U
(C)	Mt.Holly, Burlington County Airport	122.800 C/U

STATE OF NEW MEXICO

	Albuquerque	122.950 C/U
		122.800 C/U
(C)	Belen, Alexander Muni Airport	122.800 C/U
(C)	Clovis Muni Airport	122.800 C/U

STATE OF NEW YORK

	Arcade Airpark	
(C)	Athens Airport	122.800 C/U
	Bloomingburg, Shan-Wan-Ga Valley Airport	
(C)	Clarkson, Para-Tech Airport	
(C)	East Moriches, Spadaro Airport	123.000 C/U
	Fort Drum	
	Gardiner Airport	
(C)	Java Airport	
	Johnstown, Fulton Airport	122.700 C/U
	Kirkwood Airpark	122.800 C/U
(C)	Lexington-Prattville, Maben Airport	122.800 C/U
(C)	Montgomery, Orange County Airport	122.700 C/U
(C)	Malone-Dufort Airport	122.800 C/U
	Newfane, Hollands International Airport	122.900 C
	New Paltz, Stanton Airport	122.900 C
(C)	Ovid Airport	122.800 C/U
(C)	Quaker Street, Knox Airport	122.900 C
	Scotia, Valley Airport	122.900 C
	Stormville Airport	122.800 C/U
	Verona, Curtis Airport	
(C)	Wallkill	
	West Bloomfield, Fort Hill Airport	
	Westhampton Beach, Suffolk County Airport	122.950 U
(C)	West Point	

STATE OF NORTH CAROLINA

(C)	Cherry Point, Cannon Drop Zone	
	Erwin Airport	122.700 C/U
(C)	Farmville, Craft Air Park	122.900 C
	Greensboro, Southeast Greensboro Airport	122.800 C/U
	Greenville	122.800 C/U
(C)	Louisburg, North Raleigh	123.000 C/U
(C)	Luzon Drop Zone	
	Mackall Army Airfield	
(C)	Maxton, Laurinburg-Maxton Airport	122.800 C/U
	Mebane	122.900 C
(C)	Midland	122.900 C
	Mount Olive Muni Airport	122.800 C/U
	Pinebluff	
(C)	Reaford Muni Airport	
(C)	Roanoke Rapids, Halifax County Airport	122.800 C/U
(C)	Rocky Mount	122.950 U
	Thomasville, Fairgrove Airport	122.900 C

STATE OF NORTH DAKOTA

(C)	West Fargo Utility Airport	

STATE OF OHIO

	Alliance, Miller Airport	122.800 C/U
(C)	Bellefontaine, Bellefontaine Muni Airport	122.800 C/U
	Bellville	
	Bowling Green, Bordner Airport	122.900 C
	Canton, Martin Field	122.800 C/U
	Centerburg, Chapman Memorial Airport	
	Commercial Point	
	Findlay	123.000 C/U
(C)	Garrettsville, Gates Airport	122.900 C
	Grafton, Mole Airport	
	Lakefield	122.800 C/U
	Lebanon, Brownies-Lebanon Airport	122.800 C/U
(C)	Marysville, Union County Airport	122.800 C/U
	Ottawa, Putnam County Airport	122.700 C/U
(C)	Petersburg	
	Rittman, Hilty Field	
	Salem, Phillips Lakefront Airport	
(C)	Shenandoah, Oswalt Airdrome	
	Stonelick Parachute Center	
	Sycamore	
	Vickery, Wrights Field	
(C)	Wadsworth, Weltzien Skypark	122.800 C/U
(C)	Waynesville Airport	122.900 C
(C)	Xenia, Skydive Green County Inc	

STATE OF OKLAHOMA

(C)	Ada Muni Airport	122.800 C/U
(C)	Cushing Muni Airport	122.800 C/U
(C)	Goldsby, Pardise Air Haven Airport	122.900 C
(C)	Grandfield Muni Airport	122.900 C
(C)	Hugo, Nash Muni Airport	122.800 C/U
	Ketchum Craig County South Grand Lake Airport	
	Miami Muni Airport	122.800 C/U
	Muskogee, Davis Field	122.800 C/U
	Okmulgee Muni Airport	123.000 C/U
(C)	Sallisaw Muni Airport	122.700 C/U
	Tahlequah,/Earthco Reid Airport	122.800 C/U

STATE OF OREGON

(C)	Albany Propst Airport (Private)	
(C)	Creswell, Hobby Field	122.800 C/U
(C)	Estacada, Beaver Oaks Airport	122.800 C/U
(C)	Medford, Beagle Sky Ranch Airport	
(C)	Mollala, Sky Dive Oregon Airport	
(C)	Sheriden Airport	122.900 C

STATE OF PENNSYLVANIA

	Bethal, Grimes Field	122.800 C/U
(C)	Burgettstown, Starveggi Drop Zone	122.900 C
	Ceres Airport	
(C)	Chambersburg Muni Airport	122.800 C/U
	Culmerville Airport	122.900 C
	Doylestown	122.800 C
(C)	Fort Indiantown Gap-Muir Army Airfield	
	Cold Steel Drop Zone	
(C)	Freedom, Kendelberger Landing Strip	
	Galeton, Cherry Springs Airport	122.800 C/U
(C)	Hazleton Muni Airport	123.000 C/U
	Jersey Shore, Hinaman Acres Airport	122.900 C
	Meadville, Port Meadville	123.000 C/U

(C) Morgantown Airport
(C) Mt.Joy/Marietta, Donegal Springs Airpark 122.800 C/U
(C) New Hanover Airport 122.900 C/U
North East, Moorhead Airpark 122.800 C/U
(C) Vandergrift
(C) Worthington, J.T.Willie Airport

STATE OF RHODE ISLAND

Greene, Riconn Airport

STATE OF SOUTH CAROLINA

(C) Barnwell County Airport 122.800 C/U
Beaufort County Airport 122.700 C/U
(C) Chester Muni Airport 122.700 C/U
Clemson-Oconee County Airport 122.700 C/U
Columbia, Fort Jackson
(C) Loris, Twin City Airport 122.800 C/U
(C) Lugoff
(C) Moncks Corner, Berkeley County Airport 122.800 C/U
Timmonsville, Huggins Airport 122.900 C
(C) Walterboro Muni Airport 122.800 C/U

STATE OF SOUTH DAKOTA

(C) Lennox, Skie Air Service Airport (Private)

STATE OF TENNESSEE

Chattanooga 122.950 U
123.000 C/U
Clarksville, Outlaw Field 122.800 C/U
(C) Dunlap 122.900 C
Eagleville 122.800 C/U
Fort Campball, Son Drop Zone
(C) Jonesboro, Decker Farm Airport
Livingston Airport 122.800 C/U
(C) Somerville, Wings 122.900 C
Springfield Robertson County Airport 123.000 C/U
Tullahoma Regional Airport 123.000 C/U

STATE OF TEXAS

Abilene, Dyress Air Force Base
Alilene Regional Airport
Amarillo, Buffalo Field 122.800 C/U
(C) Anahuac, Chambers County Airport 122.900 C/U
(C) Austin, Birds Nest 122.900 C
(C) Beaumont Muni Airport 123.000 C/U
(C) Beeville 122.800 C/U
(C) Bryan, Coulter Field 123.000 C/U
Camp Bullis
(C) Camp Swift
(C) Canyon, Gartrell Field 122.800 C/U
Decatur, Bishop Field (Private)
(C) Del Rio International Airport 122.800 C/U
Ennis Muni Airport 122.900 C
(C) Fentress Airpark
(C) Gainsville Muni Airport 123.000 C/U
(C) Gladewater Muni Airport 122.900 C
(C) Hitchcock, Johnnie Volk Field
(C) Killen, Ft.Hood Antelope Drop Zone
(C) Killen, Ft.Hood Rapids Drop Zone
(C) Kingsville, Kleberg County Airport 122.700 C/U
Lubbock 122.950 U
122.800 C/U
(C) Midlake Airport
Panhandle, Stamps Field 122.900 C/U
Seagoville Airport
(C) Temple, Draughon-Miller Muni Airport 123.000 C/U
(C) Trenton, Tri-County Air Estates
(C) Waller, Skylake Airport 122.800 C/U

STATE OF UTAH

(C) Cedar Fort, Cedar Valley Airport 122.800 C/U
Goshen Wells, Cedar Valley
(C) Hurricane 122.800 C/U
Logan, Logan-Cache Airport 122.800 C/U
(C) Ogden-Hinckley 122.950 U
St George Muni Airport 122.800 C/U
(C) Salt Lake Muni 2 Airport 122.700 C/U
(C) Tooele Muni Airport 123.000 C/U

STATE OF VERMONT

Shelburne Airport

STATE OF VIRGINIA

Forest, New London Airport 122.800 C/U
(C) Fort A.P.Hill Bowling Green Drop Zone
(C) Fort Lee
(C) Fort Pickett
(C) Fort Pickett Dove Drop Zone
Oceana (Navy), Fentress Auxiliary Field
Oceana Naval Air Station
(C) Orange County Airport 122.800 C/U
(C) Quantico
(C) Somerville, Hartwood Airport 122.800 C/U
(C) Suffolk Muni Airport 122.700 C/U
Warrenton, Flying Circus Aerodrome 122.700 C/U
Waynesboro, Eagle's Nest Airport 123.050 C/U
(C) West Point Muni Airport 122.800 C/U

VIRGIN ISLANDS

St.Croix, Ordinance Drop Zone
St.Thomas, Cyril E.King No.1
St.Thomas, Cyril E.King No.2

STATE OF WASHINGTON

(C) Coupeville Outlying Field
(C) Elma Muni Airport 122.800 C/U
Fort Lewis, Abrams Drop Zone
Fort Lewis, Anzio Drop Zone
Fort Lewis, Burris Drop Zone
Fort Lewis, Dakto Drop Zone
Fort Lewis, Darby Drop Zone
Fort Lewis, El Guettar Drop Zone
Fort Lewis, Gray Army Airfield Drop Zone
Fort Lewis, Marion Drop Zone
Fort Lewis, Merrill Drop Zone
Fort Lewis, Mytkina Frop Zone
Fort Lewis, Point Salinas Drop Zone
Fort Lewis, Pointe De Hoc Drop Zone
Fort Lewis, Rogers Drop Zone
Fort Lewis, Solo Drop Zone
(C) Kapowsin Field
(C) Kennewick, Vista Field 122.900 C
(C) Larson Drop Zone
(C) Mead Muni Airport
Monroe, Firstair Field 122.900 C
(C) Moses Lake Muni Airport 123.000 C/U
Pullman-Moscow Regional Airport 122.800 C/U
(C) Richland Airport 122.700 C/U
Shelton, Sanderson Field Airport 122.800 C/U

(C) Snohomish, Harvey Field (C)
Snohomish, Harvey Field **123.000 C/U**
(C) Tekoa, Willard Field 122.900 C
(C) Toledo-Winlock Ed Carson Memorial 122.900 U
Walla Walla Regional Airport 122.950 U

STATE OF WEST VIRGINIA

(C) Arthurdale, Titus Field 122.900 C
Buckhannon-Upsher County Airport 122.900C
Huntington, Leann Drop Zone 122.900 C
122.950 U
Huntington, Debra Drop Zone 122.900 C
122.950 U
Morgantown, Bacon Drop Zone 122.950 U
Morgantown, Cider Drop Zone 122.950 U
Morgantown, Dawson Army Airfield 122.950 U
Morgantown, Doubt Drop Zone 122.950 U
Morgantown, Float Drop Zone 122.950 U
Morgantown, Glide Drop Zone 122.950 U
Morgantown, Melon Drop Zone 122.950 U
Morgantown, Piker Drop Zone 122.950 U
Ravanwood, Jackson County Airport 122.800 C/U
Ripley, Evans Drop Zone
Summersville Airport
Westover, Blue Horizon Drive-In

STATE OF WISCONSIN

(C) Apollo
(C) Baldwin Airport
(C) Bristol, Winfield Airport
(C) Chippewa Falls, Wissota Airport
(C) East Troy Muni Airport 122.800 C/U
Lake Delton
(C) Lancaster Muni Airport 122.800 C/U
(C) Marshall, Math-Aire Field
(C) Menomonee Falls, Aero Park Airport 122.900 C
(C) Osceola, St.Croix Valley Airport 122.900 C
(ROGER'S NOTE: The drop zoneis located apx 3 Miles to the Southeast of Osceola)
(C) Oshkosh 122.950 U
(C) Pulaski, Carter Airport 122.900 C
(C) Shiocton 122.900
(C) Superior, Richard I.Bong 122.700 C/U
Walworth, Big Foot Airport 122.900 C

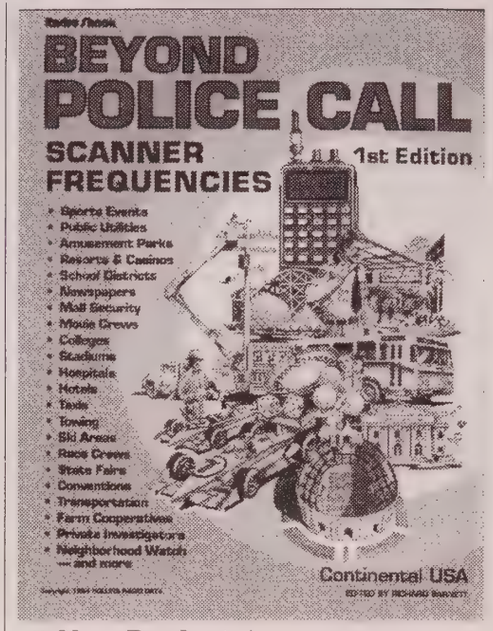
STATE OF WYOMING

(C) Casper Harford Field 122.900 C
Gillette-Campbell County Airport 122.950 U

PUERTO RICO

Aquadilla, Rafael Hernandez 123.000 C/UP
(C) Arecibo, Antonio/Nery/Juarbe Pol Airport 122.800 C/U
Humacao Airport 122.800 C/U

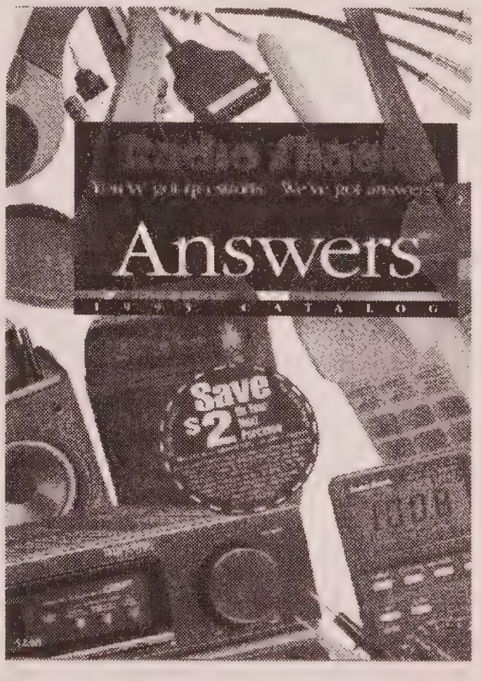
Until next issue, 73's, Roger



New Product Announcements

Beyond Police Call, is the new offering from Hollins Radio Data. Edited by Richard Barnett, a well-known publisher of East Coast frequency directories and the Monitor America frequency guide, it is being carried in Radio Shack stores nationwide. A monumental work, it covers everything from sporting events to neighborhood watch groups. As a matter of fact, we found the Multnomah Kennel Club, in our local area, which we could not find in any other publication or data base. It sells for $9.99.

While you are in your local Radio Shack store, you can also pick up a copy of their new catalog, for only $2.00.



SPACE COMMUNICATIONS

The new frontiers of scanning will be in the sky. Drect satellite scanning is the wave of the future.

THE SKY IS THE LIMIT

By Donald E. Dickerson

Satellites continue to revolutionize the way we communicate. RCA has just begun operating the first Direct Broadcast Satellite (DBS) system in the US. A TV system that provides hundreds of channels of entertainment. No need for large dish antennas and complicated and expensive aiming systems. Since the launch of the first artificial earth orbiting satellite, Sputnik, by the Soviets back in 1957, we have come to the point of complete domination by satellites. By the turn of the century there will be what are called Personal Communication Satellite systems in place. They will offer you worldwide telephone communications from a small portable flip phone. It will operate like a regular celullar phone but also give you direct access to orbiting satellites. Your home or office computer will have a modem and tranceiver that will give you access to business satellites through direct wireless radio link. Your home and car will have digital CD-quality satellite receivers instead of your analog AM and FM receivers.

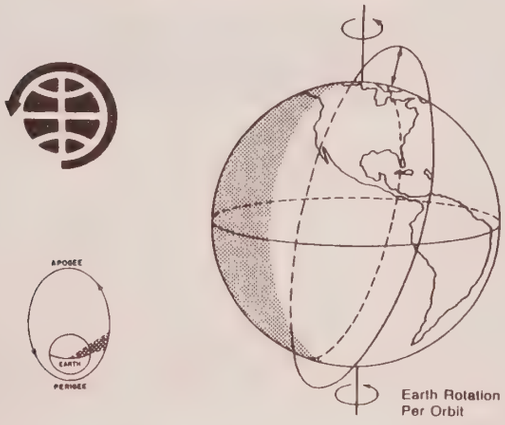
By now you are asking what this has to do with you and your scanner? Plenty! There are currently several satellite services you can tune on your scanner and there will be more in the future. And if you are a Shortwave Listener (SWL), which many scanner enthusiasts are, you may be interested to know that many foreign broadcast stations from around the world already distribute their programming to transmitter sites in other countries by satellite. In the not too distant future the broadcasters will be on satellites and you will be able to tune them like you would a local station and with the same signal quality.

So, now would be a good time to start thinking about satellites and space communications because there is definitely a satellite in your future.

Before we go into what you can hear on the satellites, let's take a look at what type of satellites are located where. The earth is buried beneath a web of satellites continously orbiting in High Earth orbit (HEO), Medium Earth Orbit (MEO), Low Earth Orbit (LEO), geostationary and the Molynia orbits. The LEO is one of the most popular orbits and has two variations. The polar orbit, used by navigation, weather and some communication satellites, and the sun-synchronous orbit used by weather and scientific spacecraft.

Let's do a quick survey of spacecraft by altitude. Most satellites are located in bands around the earth. Though they don't look like the rings around Saturn, as in figure 1, they are displayed in this manor for simplicity.

Polar Orbiting Satellites



Geostationary Satellites

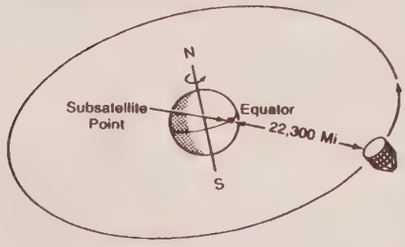


Fig. 1

A. 100-300 miles.

This is the domain of the space shuttle and the Mir space station. US and Russian navigation satellites as well as spy satellites also reside here. Mir and shuttle voice transmissions are usually in FM and in the case of the shuttle are amateur radio broadcast.

MIR	SHUTTLE	NAVSAT
143.625 MHz	145.550 MHz	149.910 MHz
145.550 MHz	259.700 MHz	149.940 MHz
121.750 MHz	279.000 MHz	149.970 MHz
142.417 MHz	296.800 MHz	150:000 MHz
10.820 GHz	1.775 GHz	150.020 MHz
11.320 GHz	1.831 GHz	
13.520 GHz	2.106 GHz	
13.700 GHz	2.265 GHz	

B. 400 - 600 miles.

This segment of space is occupied by weather satellites, geodetic and earth observation spacecraft. These include Landsat (2GHz) the French SPOT satellite (2GHz) and the NOAA (US) and METEOR (RUSSIAN) polar orbiting spacecraft.

NOAA METEOROLOGICAL

137.400 MHz	137.620 MHz
137.500 MHz	137.850 MHz

C. 800 - 1200 miles.

Spy satellites known for collecting Electronic Intelligence (ELINT), Signal Intelligence (RADINT) flurish in these parts. They are woven in amongst communication satellites used by Amateur Radio operators and other military satellites. Many of these systems use a packet format. They store the information they collect and dump it when over friendly ground stations.

D. 3,000 - 6,000 miles.

The next layer of satellites we run into on our climb to the Clark Belt are scientific research spacecraft. That is all you will find in the area. Some of the satellites are passive, that is, they do not emit radio signals of any type for general voice communications. The research satellites use frequencies allocated to such use. They are: 400.150-402 MHz, 1.400-1,429 MHz and 2,655-2,700 MHz (1.4 and 2.6 Ghz respectively).

E. 8,000 - 12,000

This layer is dedicated to navigation satellites or NAVSATS. The US operates it's Global Positioning Satellite system from here. It operates on 1,575.420 MHz (1.5 GHz) in a mode of operation called spread spectrum. The Russians operate a similar system called GLONASS on 1.2, 1.6, and 1.5 GHz. It is a GLONASS navsat that also carries the RS 10/11 and 12/13 Amateur radio satellite transponders.

F. 22,300 miles.

The Clark Belt is the location of all TV and international telecommunication satellites. This is the geostationary orbit. Other occupants of this orbit are the GOES weather satellites, Fleet Satellite Communications system (TDRS) system and will be the home of the newsest military spacecraft known as MilStar. These are the last of the SUPER SATELLITES to be built. Most spacecraft, even military ones, are now moving toward smaller, lighter and cheaper designs.

The TDRS satellites use frequencies in the 2.2 and 15 GHz range to relay shuttle communications. The Defense Satellite Communications System (DSCS) use frequencies in the

Satellite Bands

BAND	FREQUENCY	SERVICE	SATELLITE
H.F.	21.160-21.250 MHz	AMATEUR	SPUTNIK
	29.300-29.500 MHz	AMATEUR	SPUTNIK
VHF	145.500-146.000 MHz	AMATEUR	
UHF	240-328 & 335-399 MHz	MILITARY	FLTSAT
	435-438 MHz	AMATEUR	OSCAR
L	1,269.350-1,269.650 MHz	AMATEUR	
	1,458.0-1,542.0 MHz	AERO-MOBILE	MARISAT
	1,535.0-1,543.0 MHz	MARITIME	MARISAT
C	3.7-4.2 & 5.9-6.4 GHz	COMSAT/TV	
X	7.2-7.7 & 7.9-8.4 GHz	MILITARY	DSCS/SKYNET
Ku	10.9-11.7 & 14.0-14.5 GHz	TELE/TVSATS	
Ka	17.7-21.2 & 27.5-31.0 GHz	MILITARY	MILSTAR
Q	40.0-41.0 & 43.0-47.0 GHz	MILITARY	EXPERIMENTAL
V	50.0-51.0 GHz		

SPACE SHUTTLE

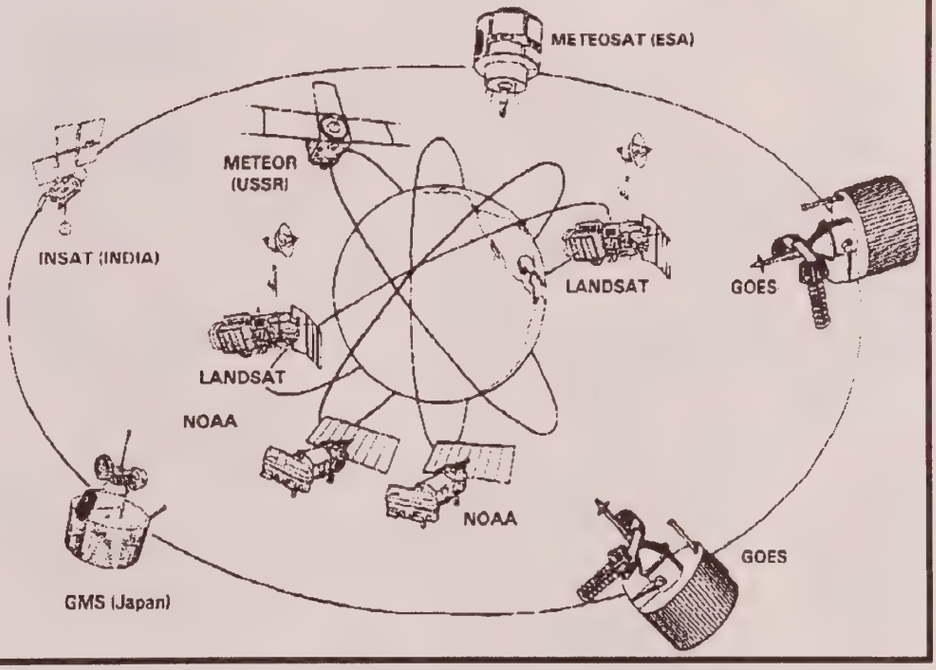
DIRECT	SATELLITE
145.550 MHz	2287.5 MHz
243.0 MHz	2217.5 MHz
259.7 MHz	15,0034 MHz
279.0 MHz	
296.8 MHz	

MIR SPACE COMPLEX

DIRECT	SATELLITE
121.75 MHz	10.820.0 MHz
142.417 MHz	11,320.0 MHz
143.625 MHz	13,520.0 MHz
145.550 MHz	13,700.0 MHz

WA3NAN SHUTTLE REBROADCAST:
3.862 MHz, 7.185 MHz, 14,295 MHz, 21,395 MHz, 28.650 MHz

Operational Earth Observation Satellites



7.2 to 7.7 GHz range. Fleetsatcom are the most commonly heard. They operate in the 240 to 399 MHz range with most of the FM voice communications heard in the 260 to 270 MHz range. Geo-stationary satellites called GOES transmit weather pictures on a frequency of 1,691.0 MHz.

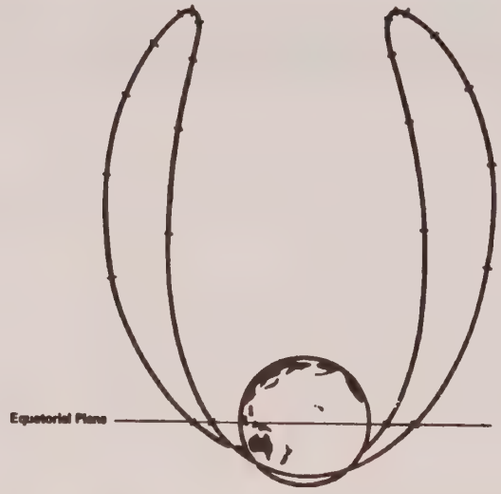
With a scanner that covers the frequency range of the satellites you want to listen to and an outside antenna you are ready to begin satellite monitoring operations. If the space shuttle, amateur radio satellite or the Mir space station are directly overhead, you don't even need an ouside antenna to hear their FM voice signals.

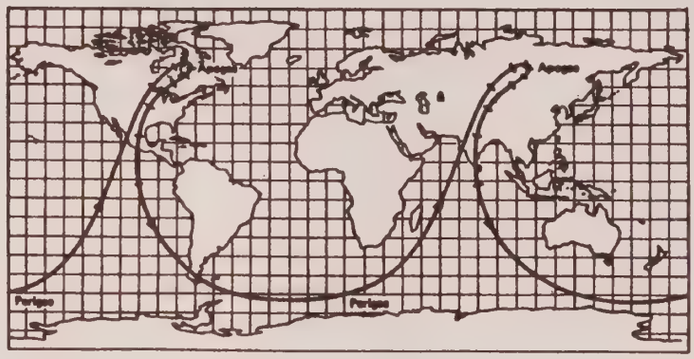
Trying to listen in on the military satellites in geo-stationary orbit are another matter. If you want usable signals you will need at least a good quality discone or vertical antenna with 9913 Belden coax cable. A yagi or twist antenna with a pre-amp will be the best combination for these high altitude satellites.

Don't forget the amateur satellites. Be sure to listen on 145.825 MHz for voice messages from the DOVE spacecraft and 145.987 MHz for FM signals from RS-14, a Russian Amateur Radio satellite.

In the not-too-distant future there will be worldwide cellular telephone service available through the technology of LEO spacecraft, and that's just the beginning. So tighten those safety belts and get ready for lift-off into the 21st century.

USSN





Stabilized Ground Track of Molniya

FLTSATCOM MILITARY CHANNELS

NAVY Frequencies MHz	AF Frequencies MHz	AF Frequencies MHz
251.950	243.775	244.075
252.050	243.900	244.080
252.150	243.945	244.085
253.650	243.965	244.090
253.750	243.970	244.095
253.850	243.975	244.100
255.350	243.980	244.110
255.450	243.985	244.145
255.550	243.990	244.155
256.950	243.995	244.160
257.050	244.000	244.165
257.150	244.010	244.170
258.450	244.045	244.175
258.550	244.055	244.180
258.650	244.060	244.185
265.350	244.065	244.190
265.450	244.070	244.195
265.550		
266.850		
266.950		
267.050		
268.250		
268.350		
268.450		
269.750		
269.850		
269.950		

INTRODUCTION TO SCANNING

Just getting started in the hobby of scanning? Here are some tips from an expert to help you get more enjoyment from your new hobby.

By Bob Parnass, AJ9S

Do Your Own Frequency Detective Work.

When you try listening to a frequency for the first time, you'll want to know who you're hearing. Although FCC rules require radio users to identify their operations with their assigned call letters, most ignore the regulation. This often makes it difficult to know who is transmitting. Moreover, many radios are now being placed in sevice illegally, without first obtaining the required FCC license.

There is a challenge in deriving new spectrum usage information on your own. Sometimes it requires several days of listening, taping, and compiling fragments of information. Other times, the frequency information is there for the taking - without hassle.

You can approach from two directions:

1. Listen first: Monitor a frequency or frequencies, and try to determine who's transmitting and what purpose the channel serves. Once you identify the user, log the information.

2. Compile first: Take advantage of opportunities, such as examining the frequency label on a quard's radio, or reading the FCC license hanging on the "radio room" wall, to compile frequency lists, then monitor the listed frequencies to confirm that they are really in use. Readers are urged to abide by the rules of good taste and local laws in the quest for frequency information. Don't trespass, wait for an invitation.

Most listeners use a combination of both approaches.

You can examine the FCC licence on premise. I have found the actual FCC radio license, complete with frequency assignments, hanging on the walls of places like the mall security office or company guard shack. You can examine the labels on radio equipment. Frequency information is engraved on labels on the back of many walkie-talkies, or inside the battery compartment, like in the Mototola HT220 model. Most pagers have labels on the bottom or inside. Like passwords taped onto terminals, it's not uncommon to find labels embossed with frequencies or call letters glued to the front of base stations.

You can make your own opportunities for eyeing the equipment or take advantage of "open house" events. If information is displayed publicly, then a resonable person could assume it's not a government secret. Hobbyists are urged to exercise a modicum of restraint and good judgement, however.

How Can I Use Equipment to Uncover New Frequencies?

If you don't know the exact frequency, but have a general idea of the rang (e.g. 151 - 152 MHz), use your scanner's "search" mode. Most programmable scanners afford the ability to search between two frequency limits set by the user. A few models, like the ICOM R7000/R7100, and R1, and older Bearcat 250 and Regency K500, have the ability to automatically store active frequencies found during an unattended search operation.

To find the frequency of a hotel communications system, one fellow installed his Bearcat 250 in his car and parked in the hotel lot, leaving the scanner in the "search and store" mode. He left the antenna disconnected so the scanner would only respond to a transmitter in the immediate vicinity.

Aside from a scanner and antenna, the most useful piece of equipment for sleuthing is a voice actuated (VOX) cassette tape recorder. You don't need a high fidelity model or anything fancy, a Radio Shack CTR-82 will do. It's best to use a shielded cable to feed the scanner audio into the recorder rather than relying on the recorder's internal microphone.

VOX recorders allow one to compress a whole day's worth of monitoring onto a single tape. I often leave a recorder "armed" and connected to a scanner at home while I am at the office or doing something else.. When call letters are mumbled, I can play and replay the tape until I hear and understand them.

Test equipment can aid in the quest for new frequency information. I've used a spectrum analyzer connected to an outside antenna, and a frequency counter for close-in work.

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SCANNER DX

Record-breaking distant reception under the right atmospheric conditions.

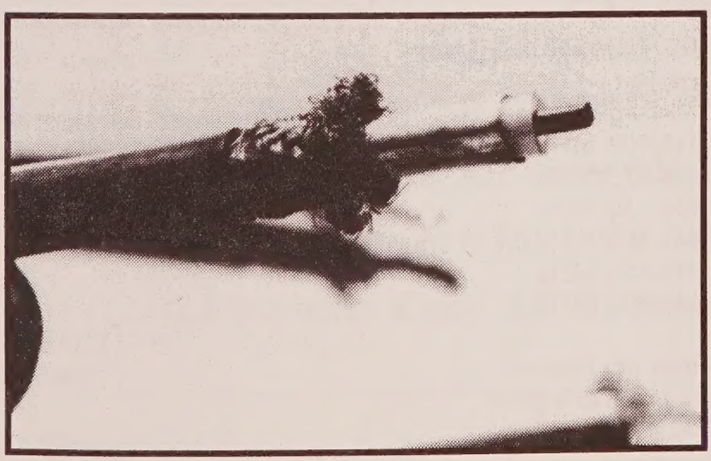
By Gordon West

Scanner enthusiasts might enjoy record-breaking distant reception under the right atmospheric conditions. Nope, I'm not talking about summertime and December sporadic-E which pulls in distant-station reception over 1,000 miles away on VHF 30 MHz-50 MHz low band. Sporadic-E propagation might even effect 140 MHz-160 MHz high-band frequencies, too, but the duration of high-band skip is approximately one-tenth the duration of low-band skip when invisible E-layer clouds drift from west to east at 200 miles up.

You can easily spot sporadic-E skip conditions by the regular up and down fading of the distant-station signal strength. For 10 seconds the signal comes in full quieting, then dips into the noise for 2 or 3 seconds, and then comes back strong for another 10 seconds, only to dive back down into the noise again for a few more seconds. Much like waves on a beach, this up and down routine with phenomenally strong signal strength, and then moments of zero signal strength, surely indicates sporadic-E skywave reception. Peak months for sporadic-E occur June through August, and a minor peak in December.

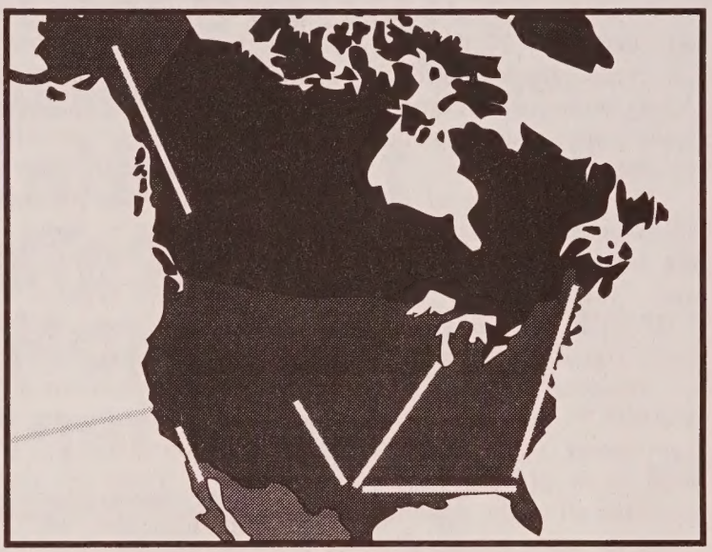
Local atmospheric weather conditions have no bearing on sporadic-E except exceptionally high altitude thunderheads. In the presence of 50,000 foot high thunderheads or tornadoes, wind shears could develop invisible sporadic-E clouds that could lead to some mighty exciting medium-range powerful reception of stations over 600 miles away.

The term "tropospheric ducting" is a phenomena that you can look for almost all year long with your scanner radio equipment. You will need top-quality RG8U coax cable and a good antenna system to maximize your tropo reception capabilities. While a directional beam antenna is preferred, even a simple discone will do the trick nicely. But if you are presently using pencil-sized RG58 or RG59 coax to your scanner, your results of distant reception will be minimal. You must switch out to thumb-sized RG8, or RG213, or Belden #9913 type coax to minimize feedline losses, and maximize your distant-station reception capabilities.



Semi-Rigid hardline (Belden 9913 type) will help reduce feedline loss for improved tropo reception.

Tropo ducting funnels signals in the atmosphere over hundreds and sometimes thousands of miles for steady signals that may last hours, days, and in rare cases weeks. Here are some of the common tropo paths that have been observed throughout the United States:



Chicago to Texas
Texas to Florida
Florida to Maine
Colorado to Texas
California to Baja California
Hawaii to California
Alaska to British Columbia

Tropospheric ducting is a radio mirage. When you look at a mirage down on the road ahead of you, you look down to the road and see the blue sky refracted above by the sharp hot air boundary layer inches above the asphalt.

In the atmosphere above us, a radio mirage is a tropospheric duct of a sharp boundary of hot air associated with a high pressure system pushing down on the air below. When you squeeze air, it gets warm. Just like a bicycle pump. If the air gets squeezed hard enough by a strong stationary high pressure system, a sharp refractive index develops approximately 1,000 feet above us, and if there is a 10 degree or greater differential in air temperature, it could very easily sustain an invisible wave guide to channel low-band, high-band, and UHF signals over hundreds and sometimes thousands of miles to a distant point also under the same high pressure system.

You can see this phenomena on a television set with an outside antenna. On some days, there is nothing on those unused local channels but snow. But during periods of windless stagnant air events characterized by smoke hanging on the horizon, you may notice TV reception coming in as far away as 200 or 300 miles. This is not sporadic-E skip--this is tropospheric ducting.

Under normal weather conditions, the radio refraction index of air, represented by the symbol "n" for "normal", is slightly over 1 (specifically 1.000345 to 1.000300). Altitude pressure decreases with height in a logarithmic manner at 1 millibar for every 10 meters in altitude. Temperature decreases 20 degrees Fahrenheit for every mile of increasing altitude. Along with pressure and temperature, water vapor also drops during normal weather conditions.

During periods of high pressure subsidence, there is a major bump in the normally smooth refractive index, and this creates an invisible VHF/UHF radio duct that will carry radio signals with little attenuation.

Amateur operator Bruce Eggers, WA9NEW, indicates, "In the northern hemisphere, there are two very permanent high pressure systems which combine all of the parameters contributing to super refractivity and tropospheric ducting--the Pacific high, to the north and east of Hawaii, and the East Coast of the U.S., where the gulf stream brings warm water north along the coast."

Just in August of '93, scanner listeners in California, Oregon, and Nevada were tuning into Hawaiian public safety broadcast stations on both VHF high band, as well as UHF. There were even reception reports of a Honolulu public safety signal heard loud and clear for two days up at 856 MHz! "I couldn't believe my ears when the Hawaiian public safety frequencies were drowning out my local 800 MHz fire channels down here in Orange County," comments Jim Ford, N6JF, a radio enthusiast in Southern California. "The amateur radio 144.170 MHz beacon was so strong that it was coming over a simple ground plane up on my roof," adds Ford.

There were also numerous reception reports of Hawaiian FM and TV stations coming into Northern and Southern California. Directional antennas helped minimize interference from local West Coast stations. And the gang in Hawaii knows that tropospheric ducting conditions are just right when their normally vacant FM music band becomes saturated from stateside signals coming in from as far south as Ensenada, Mexico, and to as far north as Seattle, Washington. "When I spin the dial and see my stereo light come on from the bottom end of the band to the top end of the band, I know it's time to head for the hill," comments Paul Lieb, KH6HME, the Hawaiian world record holder for tropospheric ducting. Paul is also an avid scanner radio enthusiast.

The August, '93 tropospheric ducting conditions were strong enough to carry a 100 watt amateur television picture from Hawaii to this author's home location in Costa Mesa. Picture quality was judged P4 by the experts who looked in on the experiment, and this was the first time in amateur radio history that an amateur television signal at 434 MHz was received over 2,200 miles away. Color, too.

These are the most common amateur radio repeater frequencies to try tuning in during periods of tropospheric ducting:

146.610 MHz	146.640 MHz
146.700 MHz	146.760 MHz
146.790 MHz	146.820 MHz
146.880 MHz	146.940 MHz
146.970 MHz	147.000 MHz
147.060 MHz	147.360 MHz

On UHF, try these popular amateur radio repeater outputs:

444.500 MHz	444.900 MHz
444.100 MHz	444.975 MHz
444.700 MHz	444.150 MHz
444.800 MHz	444.200 MHz
444.000 MHz	444.850 MHz
443.900 MHz	444.300 MHz

U.S. weather stations not transmitting in your local area are also a good indicator of long-haul tropospheric ducting:

NOAA Weather Stations
162.550 MHz
162.400 MHz
162.475 MHz

VHF itinerant high-band frequency 151.625 MHz is another area of major activity to zero in on during tropospheric ducting. Sometimes you have to go by their accent in order to determine what part of the country you are tuning in! Call letters and station locations are seldom given.

But I would say the amateur radio service holds the greatest potential for learning more about tropospheric ducting. Stop by any Radio Shack store and pick up my "No Code Plus" $9.95 amateur radio beginner licensing manual to see more repeater output frequencies listed to target your reception. Read further and bone up on ham radio, and get your Technician no-code license, and take part in tropo ducting this winter. The new FCC computer processes amateur radio licenses in just weeks, rather than months, so getting on the air can be done QUICK as soon as you pass the two easy, entry-level, multiple-choice tests.

Wintertime can still bring tropo conditions along storm fronts that extend over several hundred miles. Wintertime is not necessarily the best for slow-moving, high-pressure systems, but nonetheless, cold winter nights after a warm sunny day could very well trigger a tropospheric duct that will turn your normally quiet scanner into a long-range radio receiver picking up distant signals from the inverted radio mirage. Tropo ducting--plenty of fun for licensed hams as well as scanner radio operators.

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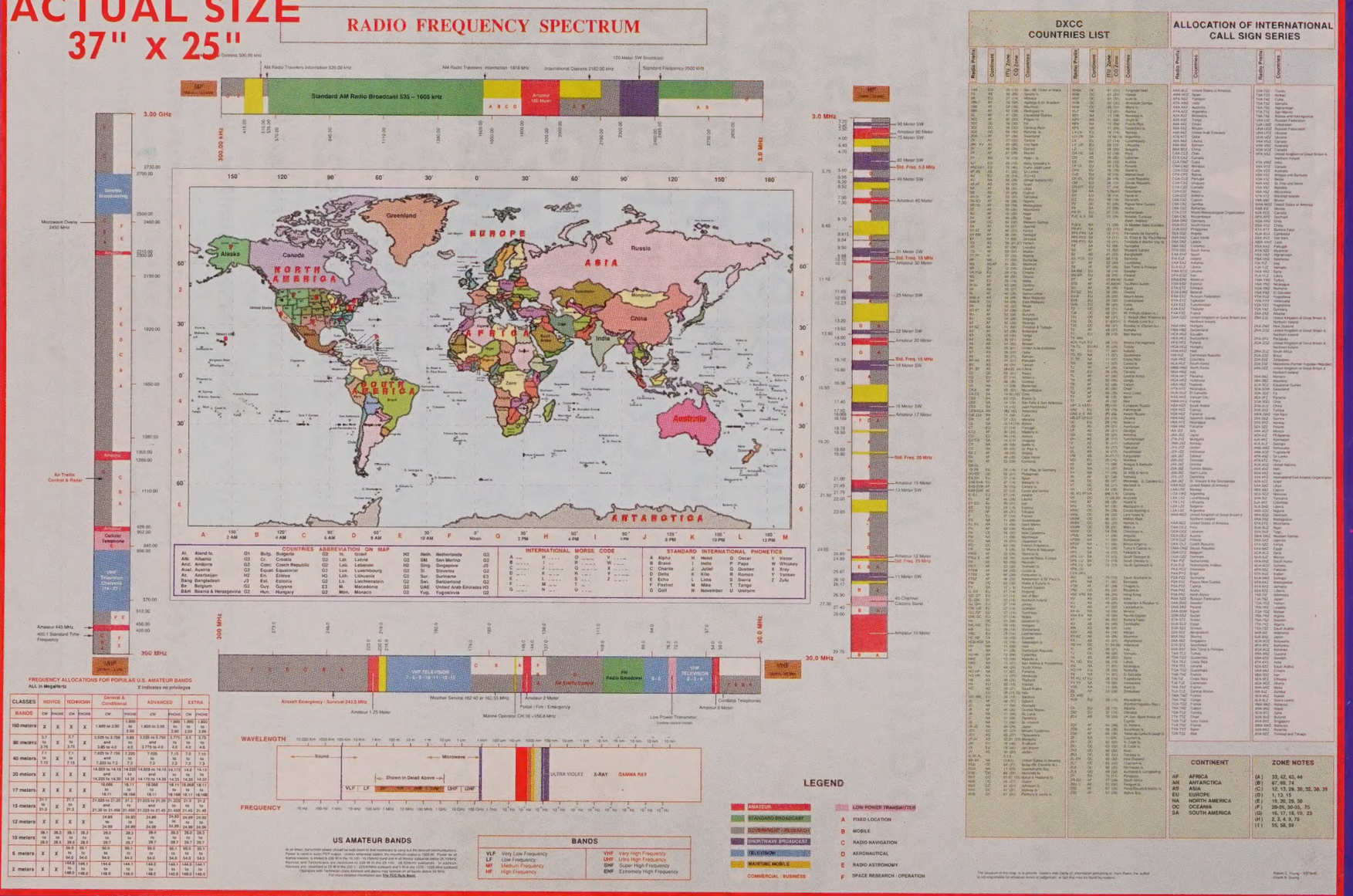

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